IEEE VIS 2014 Arts Program
Art+Interpretation

William Fairbrother
Mercedes Gimeno-Segovia
George Legrady
Ryan McGee
Joshua Dickinson
Till Nagel
Benedikt Groß
Jung Nam
Daniel F. Keefe
Kate McLean
Duncan Shingleton
Mark Kobine
Muhammad Hafiz Wan Rosli
Andres Cabrera
Kyungho Lee
Fabian Winkler
Shannon McMullen
Kim Albrecht
Marian Dörk
Boris Müller
Danny Bazo
Roderick Coover
Scott Rettberg
Daria Tsoupikova
Arthur Nishimoto
Chin-En Soo

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In certain ways artists and visualization researchers share common goals: to make things visible which are normally difficult to see; and to enable reasoning about information that we might otherwise remain ignorant of. A conventional explanation of the differences between art practice and visualization research is that artistic exploration raises new questions, while visualization research aims to help domain experts answer existing questions. However, these categorizations may be oversimplified. Media artists create opportunities for reflecting on cultural issues, but also highlight how we absorb technology and explore how the exposure to tremendous amounts of data affects our daily lives. In the visualization community, significant emphasis has been placed on notions such as indicating uncertainty, accurately portraying data provenance, and using narrative techniques to aid in transmitting information more effectively. Visualization systems not only provide a representation of data collections, but also, wittingly or unwittingly, provide an interpretation of that data. Hence, potential areas of overlap between art and research practices are becoming more discernible.

In the call for entries for Art+Interpretation– the title of this year's Arts Program– we asked artists to think about the role of interpretation in art and visualization, and to reflect on possible answers to these questions: Can artistic practice offer insight into thinking about the effective interpretability of complex data? Conversely, can visualization research offer quantifiable methods to artists seeking to investigate and represent cultural phenomena?

The thirteen artists and collaborative teams participating in the VISAP'14 Art Show present work that is not only aesthetically compelling, but that also wrestles with these questions, using their art as a method for analyzing existing methods of interpretation and as an opportunity to present new forms of meaning-making. We invite you to join with the VISAP'14 artists in thinking about the many intersections between art and research.

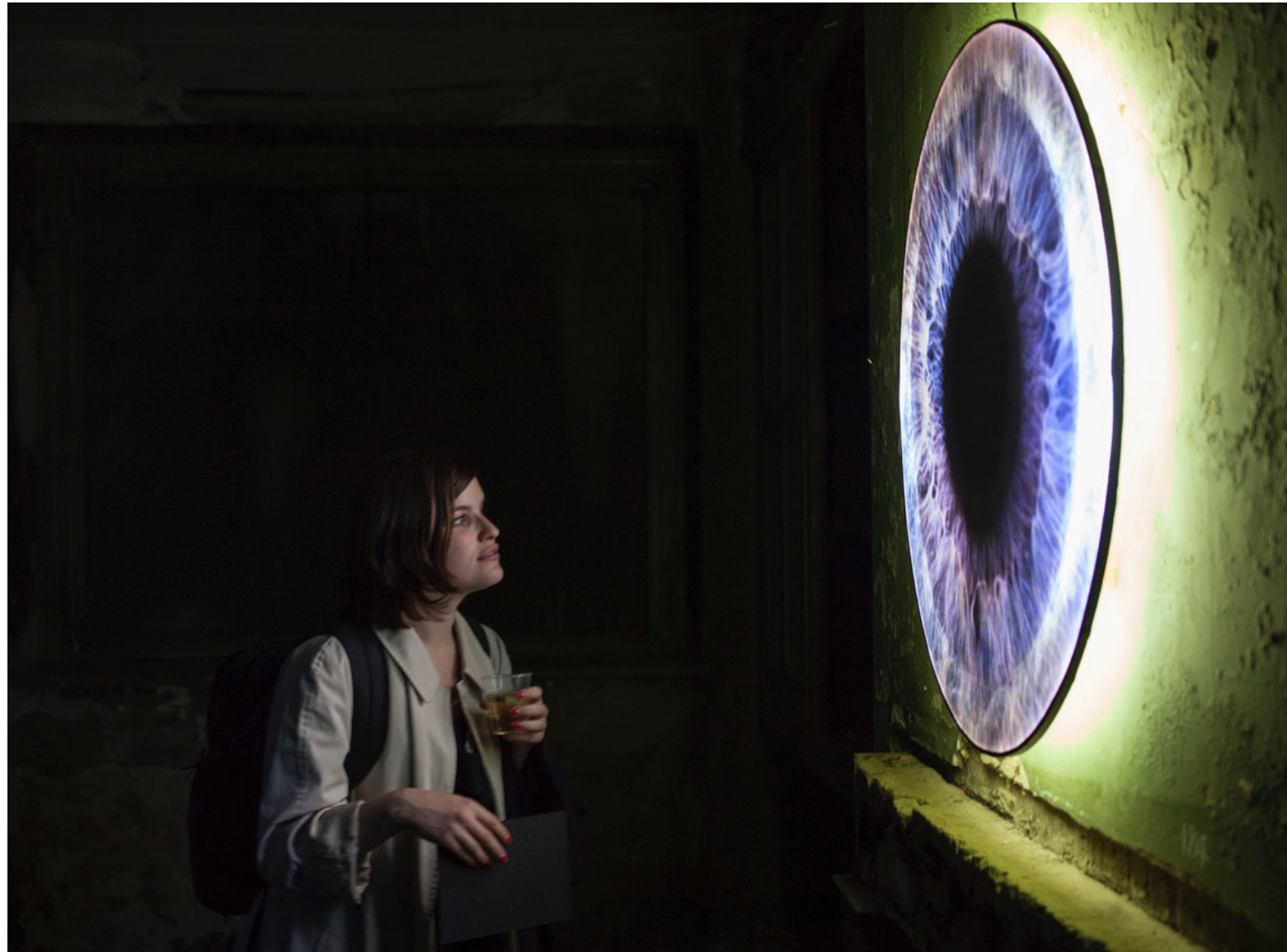We would like to acknowledge everyone on the IEEE VIS 2014 Organizing Committee, and especially Gautam Chaudhary and Jean-Daniel Fekete, without whose support the Arts Program would not have happened this year. We also thank the large pool of expert reviewers on the VISAP Program Committee, too numerous to list here. Finally, we thank Lauren Thorson, the VISAP'14 Design Chair, for her many contributions, including the creation of this Art Show catalog.

Angus Forbes &
Fanny Chevalier,
co-chairs, VISAP'14

VISAP'14 Art Show Exhibitors–

Observation, 2014

William Fairbrother
Royal College of Art
Mercedes Gimeno-Segovia
Imperial College London

Observation is a circular backlit lenticular print that presents an interpretation of the work of Mercedes Gimeno-Segovia, a PhD student in physics at Imperial College London. The artwork illustrates the concept of superposition, a fundamental principle of quantum physics. The work was originally funded by the Institute of Physics as part of a public engagement program to help communicate difficult concepts of quantum physics through a series of objects, installations and experiences. Quantum physics occurs at a scale inaccessible to humans. In the case of superposition, when we attempt to observe a qubit being in two states simultaneously, its quantum properties are destroyed and we see it as only one or zero.

Voice of Sisyphus, 2012

George Legrady
  UC Santa Barbara
Ryan McGee
  UC Santa Barbara
Joshua Dickinson
  UC Santa Barbara

Voice of Sisyphus is a time-based study of a single photograph, realized as a continuous performing audio-visual composition. It is presented as a multimedia installation with a large cinematic projection and 4 channel audio, spatializing sounds by speakers positioned in each of the four corners of the exhibition room. The sound composition is produced by an image-processing interface selecting image areas and transform them through frequency filtering, masking, and other methods, meanwhile converting them to sound. The interface operates in real-time and consists of settings visible over the image. The software additionally allows for full polyphonic sound through the build-up of multiple image regions operating simultaneously. The sounds are produced by two sonified regions. The first consists of the full image, providing a harmonic background over which a second contrasting voice is created based on smaller, selected regions of the image. This interplay can be equated to "bass and counterpoint" in traditional musical terms. The visual and tonal values are defined by a set of parameters that include low-pass filtering, hi-pass filtering, frequency, volume, mask, noise, and threshold.

Excerpts of the animation can be viewed online at: https://vimeo.com/99210579

Shanghai Metro Flow, 2013

Till Nagel
MIT SENSEable City Lab
Benedikt Groß

One of the main characteristics of cities is the large amount of people moving around. These flows are reflected in all the subways dashing through the city. With our visualizations we want to give an impression of this pulse of the city.

Shanghai Metro Flow consists of an animation and an accompanying infographic poster. The animation is composed of three scenes, each giving another perspective into the metro network. The static poster shows details on the subway lines. Each visualization combines established techniques with an highly aesthetic form in order to attract people to observe and dwell on different aspects of urban mobility.

Spatial Correlation, 2014

Jung Nam
   University of Minnesota
Daniel F. Keefe
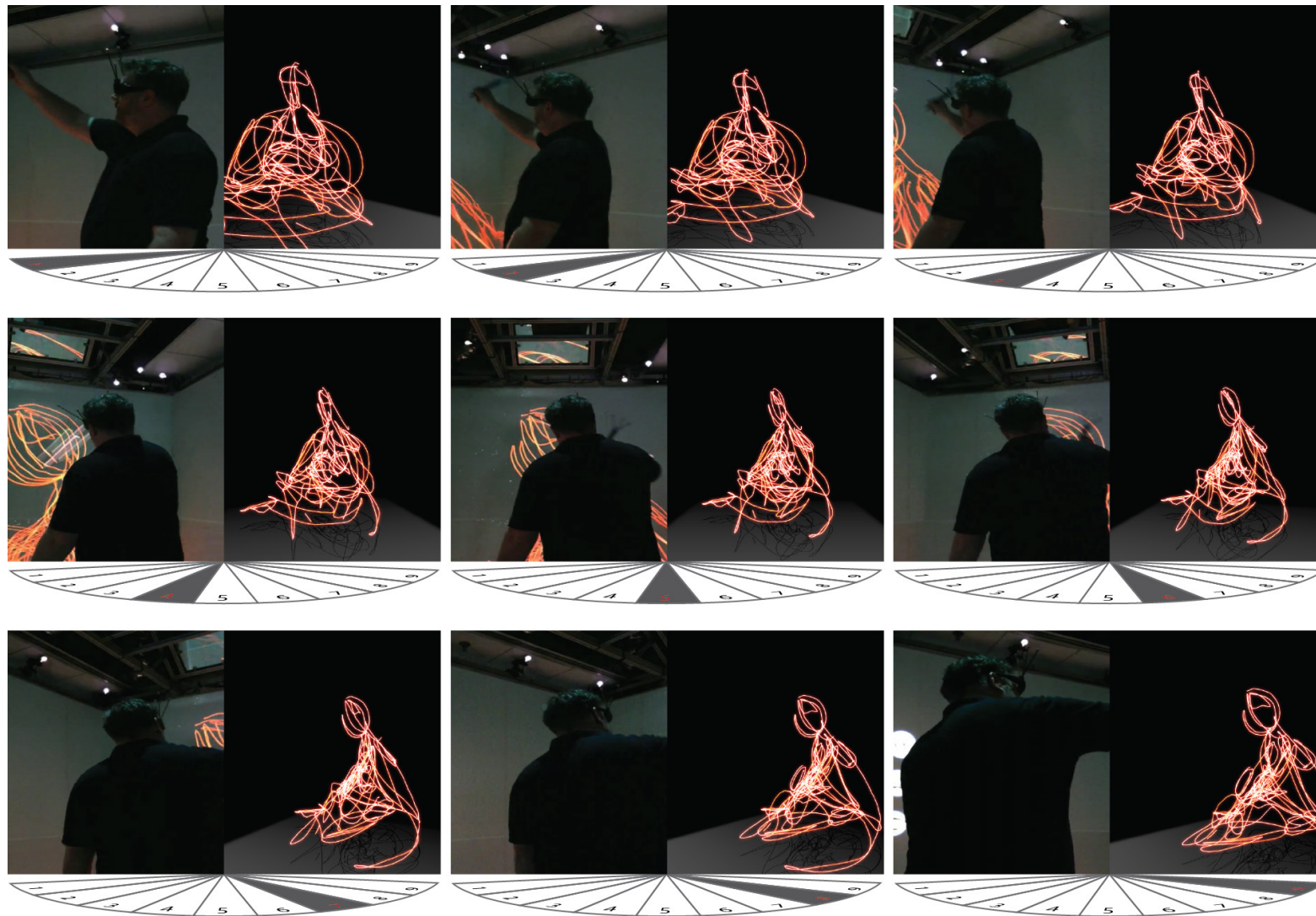   **University of Minnesota**

Spatial Correlation is an interactive digital artwork that provides a new window into the process of creating handcrafted virtual sculpture in a CAVE virtual reality (VR) environment. The artwork displays a series of original sculptures that were created using a 3D user interface that turns sweeping physical movements of the artist's hands into 3D virtual forms. The artist's movements are gestural, almost like a dance. Each movement was recorded using 3D motion capture technologies and an array of video cameras.

Spatial Correlation replays the sculptural process for viewers by visualizing the video data side-by-side with the virtual sculptures and synchronously animating these visualizations to show each physical body movement of the artist and the corresponding sculptural result over the several minutes it took to complete each sculpture. The visualizations also respond to the position of viewers within the gallery space.

As viewers walk around Spatial Correlation, the viewing angles for the video and computer graphics displays change dynamically so as to create the effect of looking through two virtual windows: one pointing into the physical world in which the piece was created and the other into the virtual world in which the sculpture now exists as 3D computer graphics lines in space.

Media Used:
Custom software and hardware: 3D computer graphics and CavePainting software, multi-perspective video capture system, optical 3D tracking and depth sensors.

Smellmap: Amsterdam, 2014   **Kate McLean**
                                                  Royal College of Art

Creating a smellmap of a city is a collaborative exercise. During a series of smellwalks, local participants identify distinct aromas emanating from specific locations and record the description, expectation, intensity, personal association, and reaction. I then analyse this data, along with conversations arising from the walks, and select a set of smells that convey the smellscape of the city at that moment in time, visualsing the scents and their locations in the city as a "map". The resulting map visualisations are propositions: indications of what one might smell in a certain place. The map is accompanied by scents which are the nasal stimuli, and a catalyst for discussion. This visualisation/ olfactory art emphasises human interaction with a vast set of contestable sensory data.

Collaboration between Kate McLean (Research, scent specification and visualisation) with International, Flavors & Fragrances Inc. (Scent manufacture and original fragrance blend design)
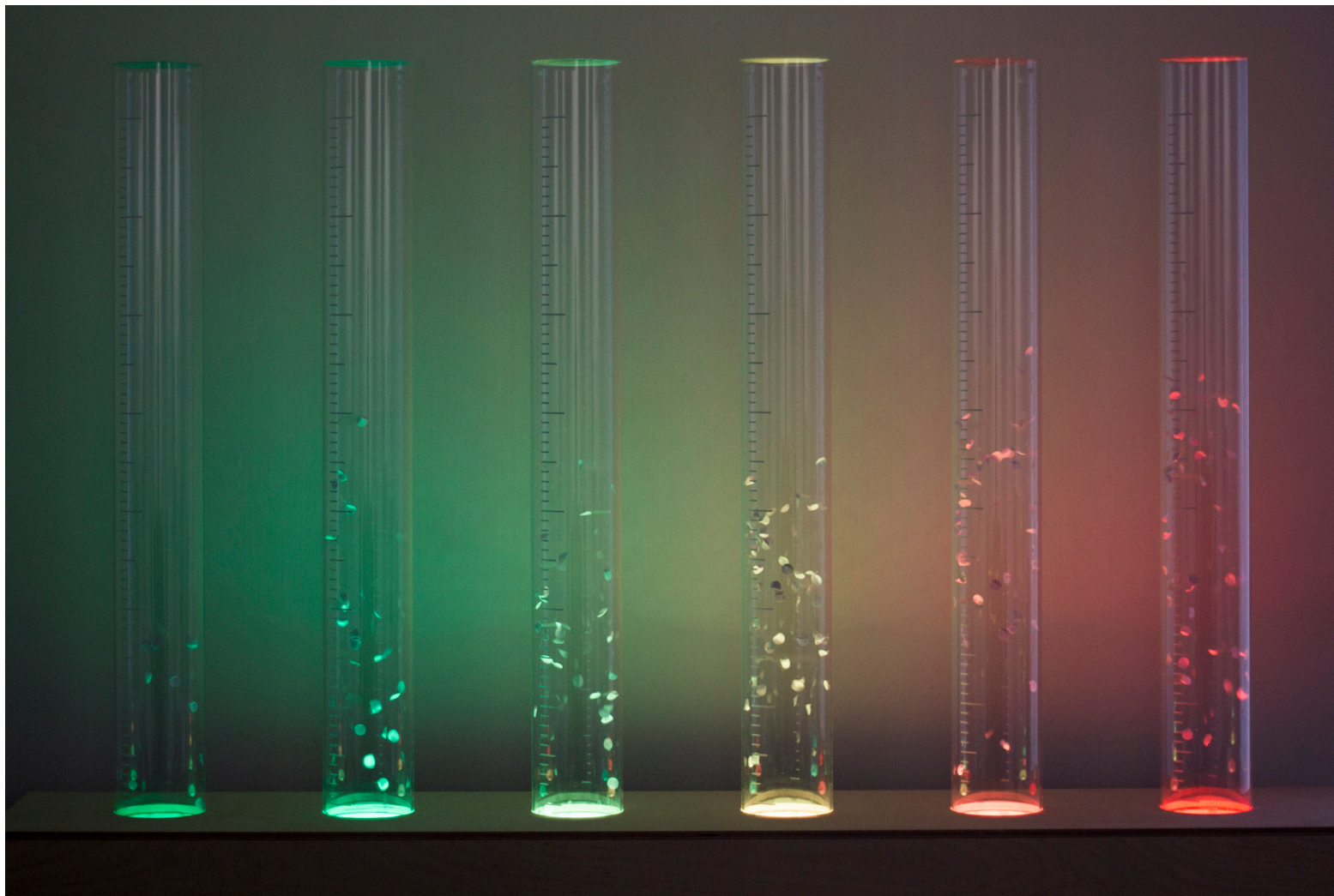
More:
www.sensorymaps.com

Flows: Manifesting CO2 Emissions, 2014

Duncan Shingleton
 Edinburgh College of Art
Mark Kobine
 Edinburgh College of Art



Flows explores Manuel Castell's theory of the Space of Flows, proposed in The Rise of the Network Society (1996), which relates to network society and technologies role in a new type of space. Flows bring things and people into synchronous, real-time interrelationships made up purposeful, repetitive, programmable sequences of exchange and interaction. Therefore we can define flows as consisting of three elements – the medium through which things flow, the things that flow, and the nodes among which the flows circulate. Flows interprets these three elements through vehicles, CO_2 emission ratings data and the A354's ANPR cameras.

Flows scans registration plates in real-time across the six camera sites on the A354 between Dorchester and Weymouth. As vehicles pass the cameras a vehicle lookup enquiry is made to ascertain data on their CO_2 emission rating, which is then used to drive Arduino controlled air turbines, generating movement in six particle filled acrylic tubes. As the total amount of CO_2 emitted ebbs and flows, the air rate is increased and decreased in correlation, changing the velocity of the particles, and at the same time the tubes are flooded with light corresponding to the now ubiquitous environmental ratings charts. In this way, the viewer gains a material insight into the immaterial flow of CO_2 between Dorchester and Weymouth at any given moment in time.

Point Cloud, 2014

Muhammad Hafiz Wan Rosli
  UC Santa Barbara
Andres Cabrera
  UC Santa Barbara

Data visualization is a powerful tool to communicate data in a clear, digestible format through graphical means. But in order to be effective, form and function need to work in tandem, filtering layers of noise to reveal the key aspects of the analyzed data. Indeed, this could prove to be sufficient in discovering already known patterns. However, the search for undiscovered patterns would require the full dataset to be presented as a whole, which bears the risk of sensory overload. Our sensory systems function as a systemic unit, in relation to one another, dynamically sampling the signals around us to give a concise scene analysis. In order to decipher a complex, multidimensional dataset, a representational system that is able to reproduce the layers of information through different stimulations would be required. We explore the possibilities of using multimodal data representation as a method to communicate multidimensional data, guided by the principles of Gestalt Psychology. Point Cloud, an artwork that implements such explorations through the visualization and sonification of lightning data, is presented as an application of this research.

Visualizing Expressiveness in Conducting Gestures, 2014

Kyungho Lee
University of Illinois
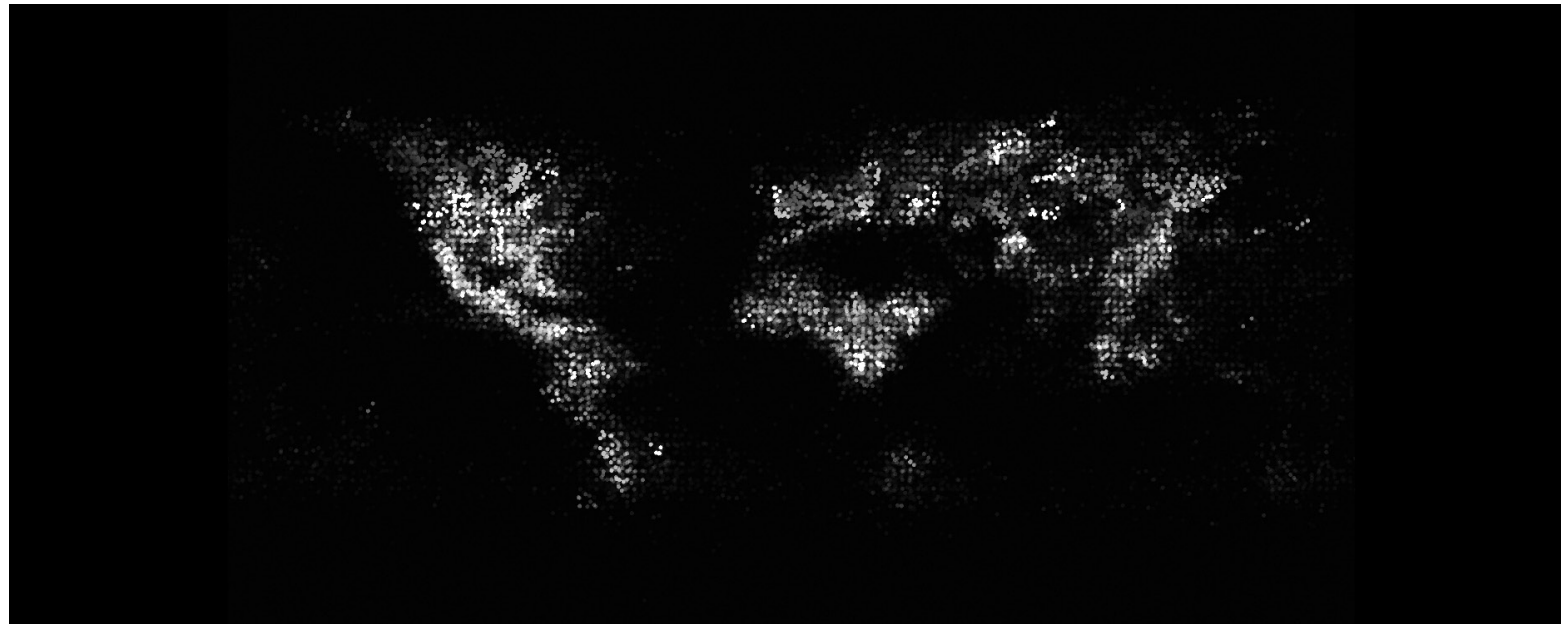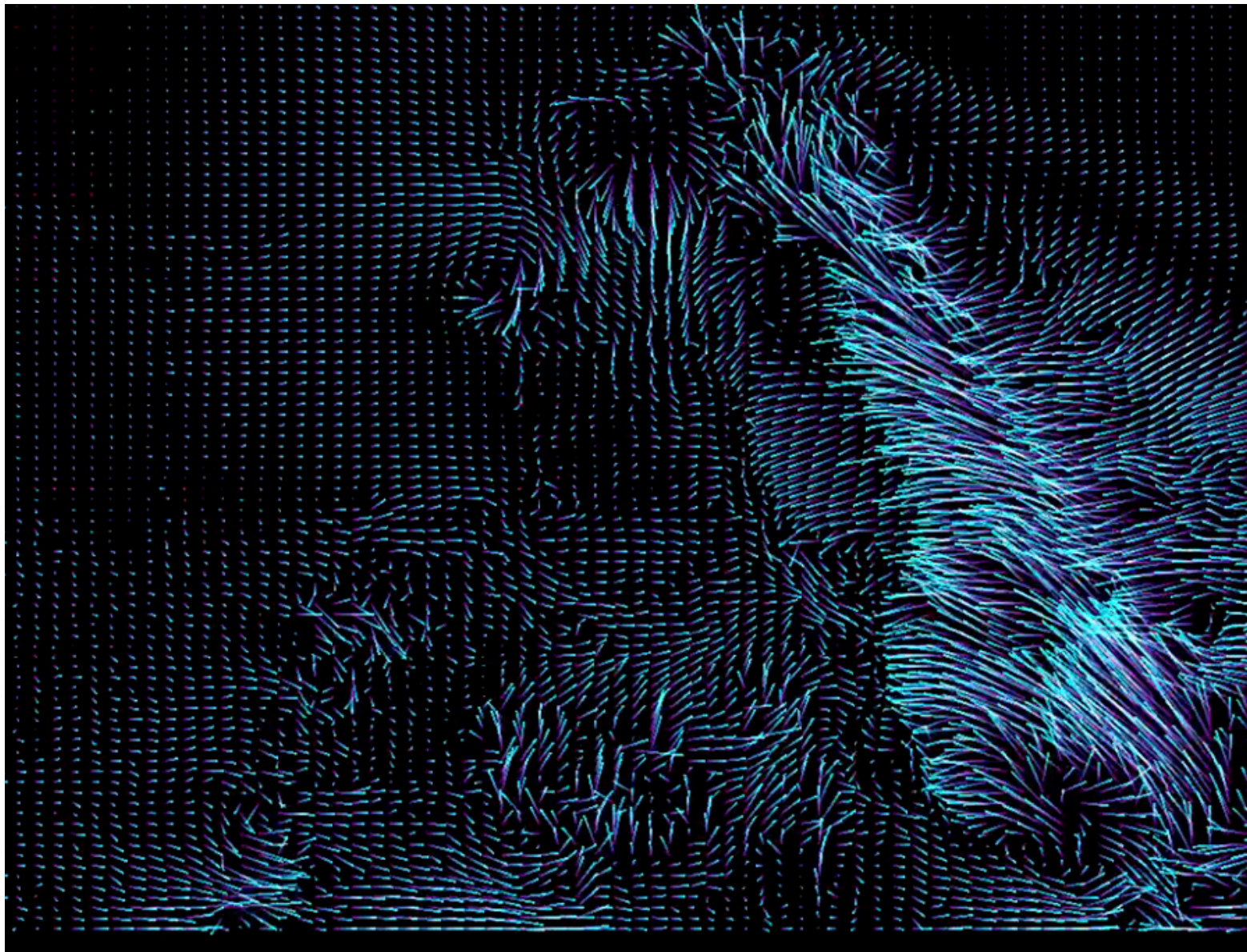
Conductors put their best efforts to make gestures for portraying the imagined-ideal, along with the innermost concept of a musical piece and a composers implication. Since a conductor uses his/her gestures in order to communicate and interact with every performer in a symphony to characterize the quality of the piece performed, their gestures should be considered another sort of symbolic, embodied language which contains a high bandwidth of information. In this project, we present a novel way of visualizing the expressiveness in conducting gestures by synthesizing two approaches. The first one is a visualization method that aims to enable a robust amplification of a conductors gestures by using the optical flow and 2D fluid simulation with a particle generating system. The other is a machine learning approach that enables us to track the conductors gestures with the two hands and classify them into the three fundamental factors of movement, such as the Weight, Space, and Time, from the perspective of Laban Movement Analysis(LMA) theory. The visualization captures the real time video of the conductor and processes it through the visualization algorithms to generate 128,000 particles per frame to depict the expressiveness of the conductors gestures, which is being characterized by the motion factors. With this interactive visualization, a general audience will be invited to perform their own conducting gestures to witness the expressivity revealed in gestures on the fly.

**Soybots: Mobile
Micro-Gardens, 2014**

Fabian Winkler
Purdue University
Shannon McMullen
Purdue University

A small fleet of autonomous robotic platforms, outfitted with custom planter boxes containing soybean plants, roams the gallery in search of optimal light conditions for plant growth. The robots' movements are based on a phototropic control strategy, using sensors to track and follow sunlight intensity or to locate LED grow lights. However, individual robots can also be guided or distracted by flashlight beams aimed at their sensors. The soybean plants in this work were chosen for their significance for global food production and also because of their strong association with a hybridity between nature and technology - in this case as a result of biotechnological strategies for increasing crop yields through genetic modification. As self-pollinating organisms—paired with a light-seeking mobile platform, they also metaphorically address increasingly independent botanical/technological hybrids. Gardens merit attention as locations where art and technology produce material realities and social narratives with political consequences. Soybots belongs to a longer investigation of gardens as sites for critical reflection that started with the National Security Garden public artwork (http://www.gardensandmachines.com/NSG_Singen). The artists see this work as a speculative installation that suggests questions about agricultural and robotic futures implicated in contemporary practices and values. Specifically, the project attempts to translate and interpret what plants need into code that drives the behavior of the robots.

While roaming through architectural space, each robot transmits both sensor data and positional coordinates to a visualization window in the gallery. The upper half of the window plots positional data in real-time as lines: dense in areas of high light levels and sparse in darker areas. This part of the visualization connects architectural space to movement and light, while the lower part of the window displays statistical information, comparing average light values and distance traveled at the end of each day. Making this interface visible to visitors inspires thought about energy need, consumption and balance - comparing forms of sun and electrical energy. As one observer of the work has remarked this graphical representation also suggests that 'the process of photosynthesis is more deeply entangled with technology and cultural-based ecologies than perhaps previously imagined. Rather than being simply a translation of light into plant matter, photosynthesis extends through food webs to include the relationship between humans and technology.'

More:
www.gardensandmachines.com

Culturegraphy, 2014

Kim Albrecht
    University of Applied
    Sciences Potsdam
Marian Dörk
    University of Applied
    Sciences Potsdam
Boris Müller
    University of Applied
   **Sciences Potsdam**

Culturegraphy visualizes the exchange of cultural information over time also known as memes. Treating cultural works as nodes and influences as directed edges, the visualization of these cultural networks can provide new insights into the rich interconnections of cultural development. The graphics represent complex relationships of movie references from IMDB (Internet Movie Database) and influences between popular individuals from Wikipedia. All findings were made in a process which involved network scientists, a media theorist, and a sociologist. The role that visualization can play in bridging scientific communities was central to this work. In this sense, the resulting visualizations were process involving to bring researchers from different disciplines together. Today physicists through the study of networks ask similar questions as media theorists or sociologists with very different techniques and methods. Visualization can serve as a common language that brings fields together, shows differences, but also has its own idiosyncratic views.

Automatically Generating Animations From Escher's Images, 2014

Danny Bazo
UC Santa Barbara
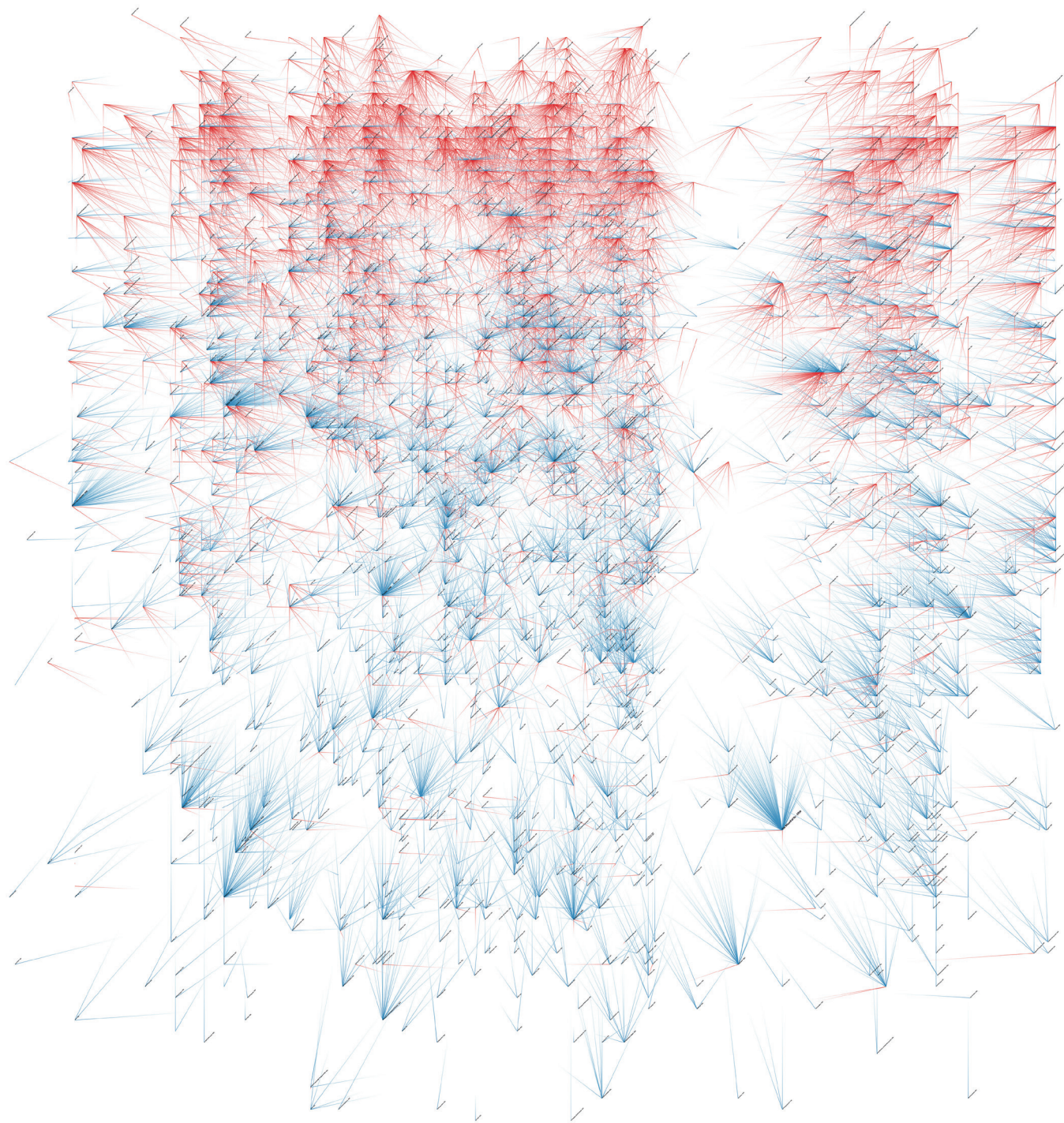
The tessellating, morphing images created by M.C. Escher (1898-1972) have long fascinated artists and scientists alike. The mathematically complex symmetries in works such as Metamorphosis III (1967) combine beautiful aesthetics with a deep understanding of repetition and structure.

Using a digital scan of Metamorphosis III, this work presents an interactive tool for exploring visual patterns present in two-dimensional images. The custom software, inspired by the movement of the human eye, automatically transforms parts of Metamorphosis III into an animated sequence that unfolds in time.

The image processing algorithm underlying this transformation is designed to find regions of visual similarity in an image. Visitors choose a portion of Metamorphosis III, and the software calculates a "path" through visually-similar regions in the image. The individual steps in this path are sequenced into an animation that is played back to the visitor.
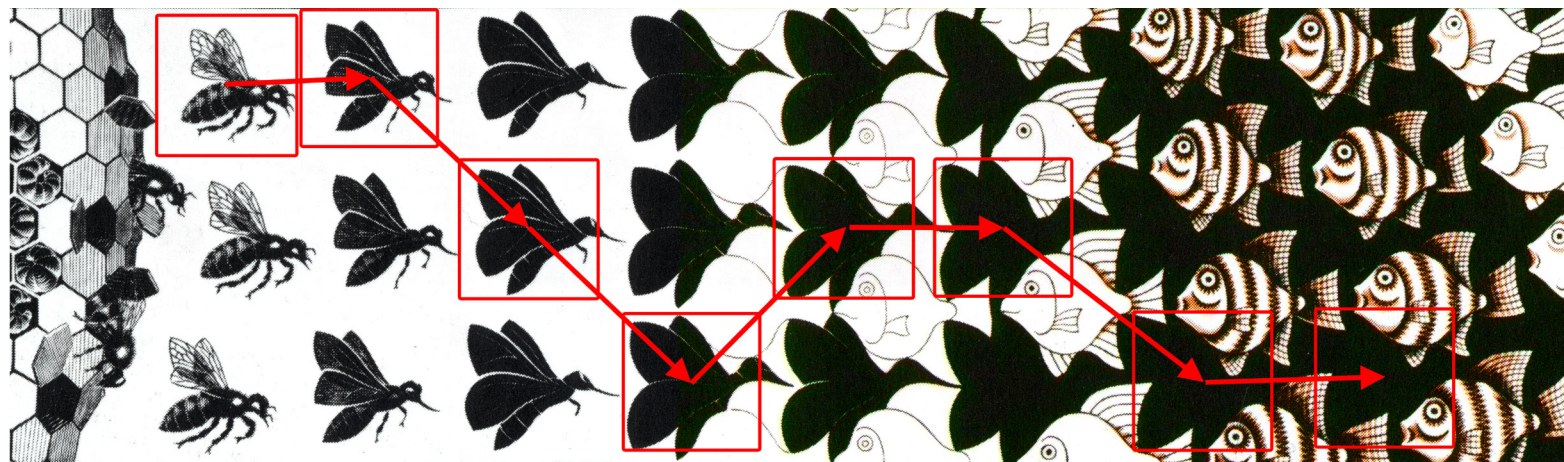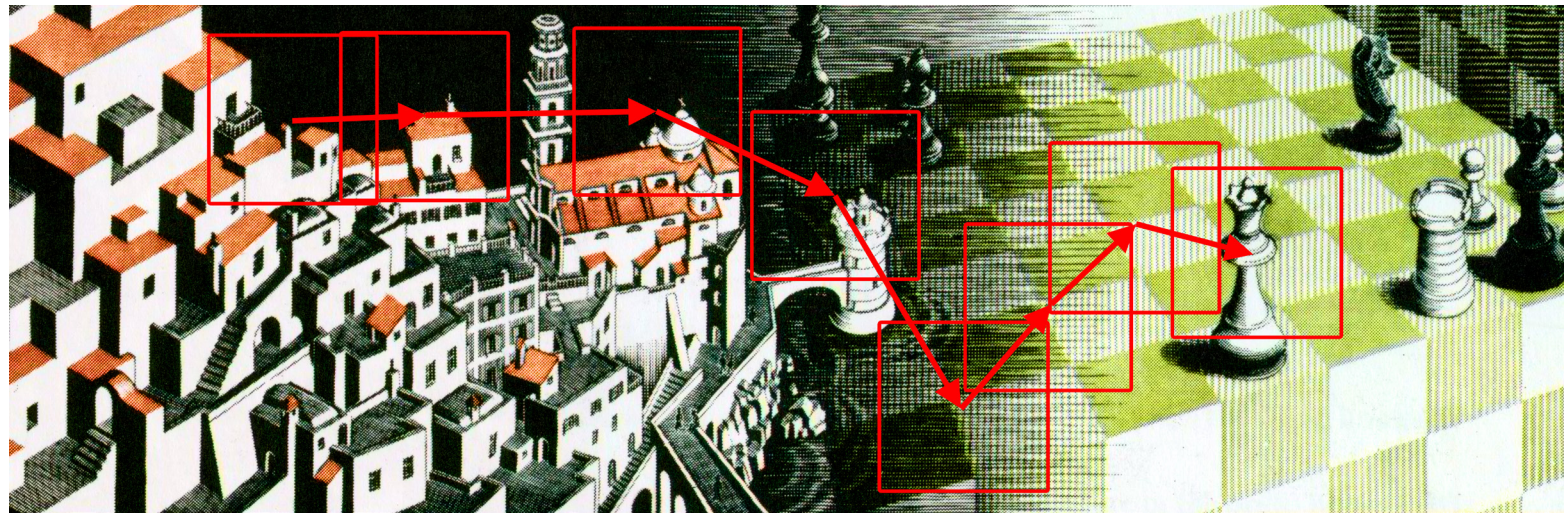
Hearts And Minds: The Interrogations Project, 2014

Roderick Coover
    Temple University
Scott Rettberg
    University of Bergen
Daria Tsoupikova
    University of Illinois at Chicago
Arthur Nishimoto
    University of Illinois at Chicago

Hearts and Minds: The Interrogations Project is an interactive Virtual Reality narrative performance made for the EVL's CAVE2 large-scale 320-degree panoramic virtual reality environment. The project visualizes stories of violence and the post-traumatic stress experienced by ordinary American soldiers who became torturers in the course of serving their country. During the American-led counterinsurgency and counterterrorism campaigns in Iraq in the years after September 11, 2001, the torture and abuse of detainees was a commonplace tactic.

Video Documentation:
http://youtu.be/jJFgsFXMF_s

Psycolorgy, 2014

Chin-En Soo
The University of Waikato

The "Big Five" personality test is based on the general consensus in the field of psychology that there are five fundamental personality traits: Extraversion, Openness, Agreeableness, Conscientiousness and Neuroticism. Participants taking this test are required to answer a series of questions and rate them using a Likert scale. The analysis of the answers results in a description of the participant's personality in terms of the five traits.

The Rorschach technique is a method of psychological evaluation. Psychologists use this test in an attempt to examine the personality characteristics and emotional functioning of a participant. This test is often employed in diagnosing underlying thought disorders and is used to differentiate psychotic from non-psychotic individual discreetly.

Psycolorgy combines these two existing psychology tests to generate a distinctive and unique visual result. The visualization enhances the concept of portraying an individual's personality in an artistic presentation and creates interactivity between the visualization and participants. Non-participants can also enjoy the beautiful aesthetic expression of the visualized results.
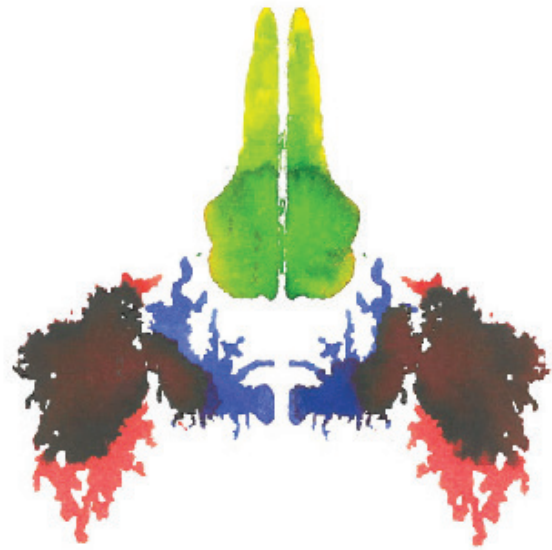
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