BIRD SONG DIAMOND

Sound Art Installation: 2014 – present

Charles Taylor, evolutionary biologist (UCLA), Victoria Vesna, artist (UCLA), Takashi Ikegami, physicist (University of Tokyo)

Collaborators:

Art Sci collective*: sound artist Joel Ong (PhD candidate, University of Washington, Seattle; Aisen Caro Chacin (PhD candidate, University of Tsukuba); John Brumley (MFA candidate, UCLA Design Media Arts); Reiji Suzuki (Associate Professor, Nagoya University); and Mary Tsang (MS candidate, MIT media lab); Max Kazemzadeh (Associate Professor & Program Director, Gallaudet University)*
&
Ikegami laboratory: Mizuki Oka, Atsushi Masumori, Itsuki Doi and Norihiro Maruyama (University of Tokyo)

"The intent of this project is to permit humans to understand the grammar and meaning of bird songs. Recent advances in sensor arrays, computation, and computational linguistics finally make this long-sought goal achievable." (Charles Taylor, 2011) Beyond developing better analytical tools, this project engages artists who are well versed in the development of art|science interface and interactive installation with sound, to establish an experience that overlays aspects of the life, loft, and language of a bird with that of human characteristics. This last investigation has broad appeal, and can serve to engage younger people to notice their environments and to participate more in scientific activities and initiatives.

Bird Song Diamond is an interactive installation based on long-term research (2011-present) allowing multifaceted, interdisciplinary perspectives -- uniquely connecting the nodes of evolutionary biology, artificial intelligence, spatial sound, mechatronic art and interactive technologies. The diamond as a crystal lattice of connected nodes reflects the commitment of each node to its disciplinary rigor held together in balance through shared interests. The sound art installation is an effort to include multiple new facets of the larger public -- from children to art lovers and from academics to theoreticians.

As an exploration into the interdisciplinary collaboration, the sonic components of the installation are composed under the auspices of the scientific team led by evolutionary biologist Charles Taylor who has been systematically categorizing bird sounds and determining the patterns of communication within spatial networks of birds in the field. Taylor also brings to the art sci team many of his collaborators, including ecologist Dr. Martin Cody, linguist Dr. Edward Stabler and physicist Dr. Takashi Ikegami and his group from the University of Tokyo. It should be noted that Ikegami has collaborated with sound artists on a number of sound installations in the past.

The new tools and methods for collecting and analyzing bird song now allow a level of observation that previously would not have been possible. We are now collecting truly vast amounts of data from previously inaccessible settings and subjecting data to previously undiscovered sophisticated structural analyses. It will be transformational to computational linguistics if the natural world beyond humans were shown to have languages that are radically different from our own (as seems quite likely). Our analysis will be aided – in fact only possible – to the extent that we can view the environment from bird's perspective -- emphasizing the important role for artists in our collaboration.

A guiding theme to our research is the role of complexity and chaos in communication systems. With reference to the complexity categories studied by Wolfram and Langton, the systems we are researching are situated at the edge of chaos: their complexity is above that of fixed sequences of symbols or sounds, but below that of chaotic or purely random systems -- at the phase transition between complexity categories 2 and 3. Meaning emerges and is communicated through the evolution and maintenance of intermediate complexity -- patterned sequences that are simple enough to be understood, but sufficiently complex that they can carry expressive data or meaning. Among the systems whose vocalizations fall into that class are human language, and the songs of at least three species of birds that we have been studying -- California Thrasher and the Cassin's Vireos and Black-headed Grosbeak. These comprise the target species for this project; our work features field recordings and analyses unique to their songs.

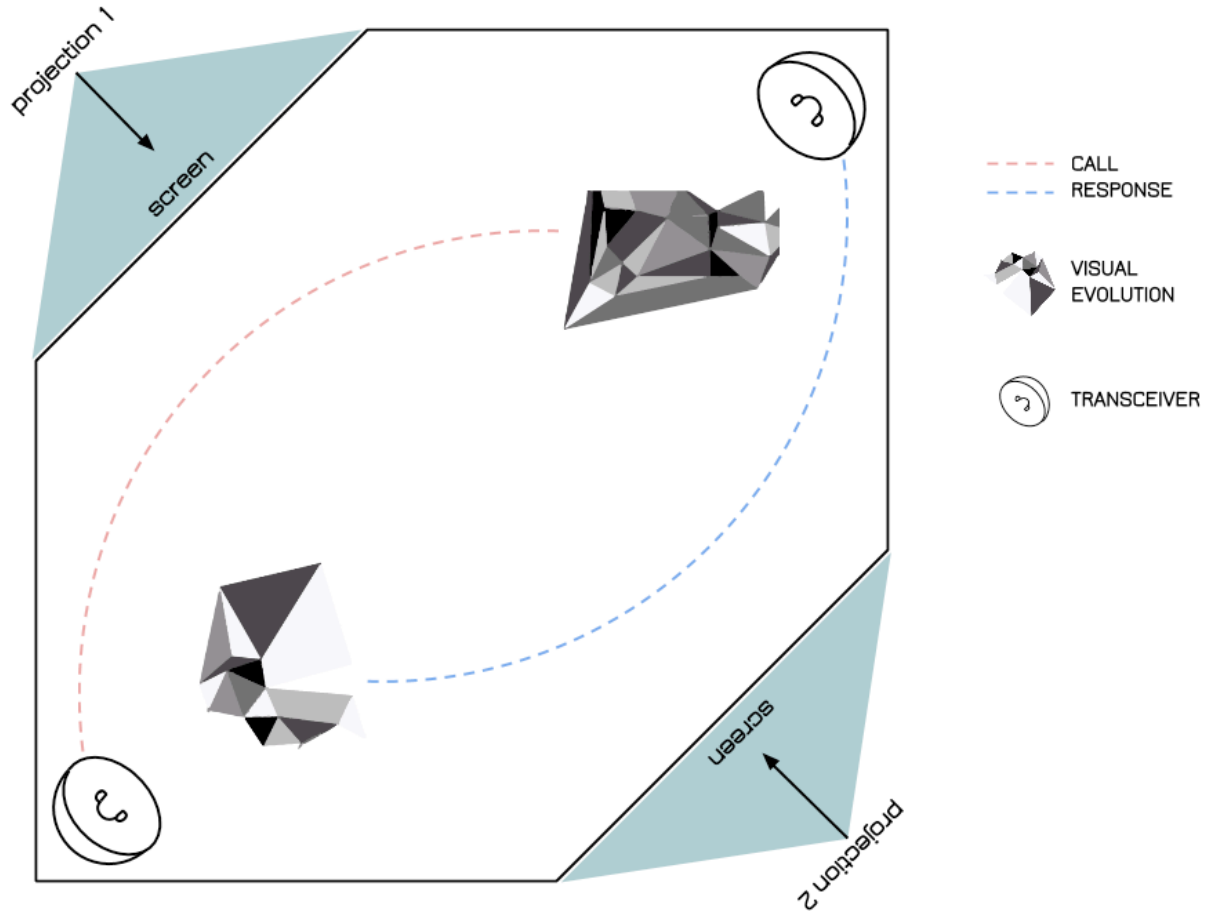
Sound Installation

The sound installation has two components:

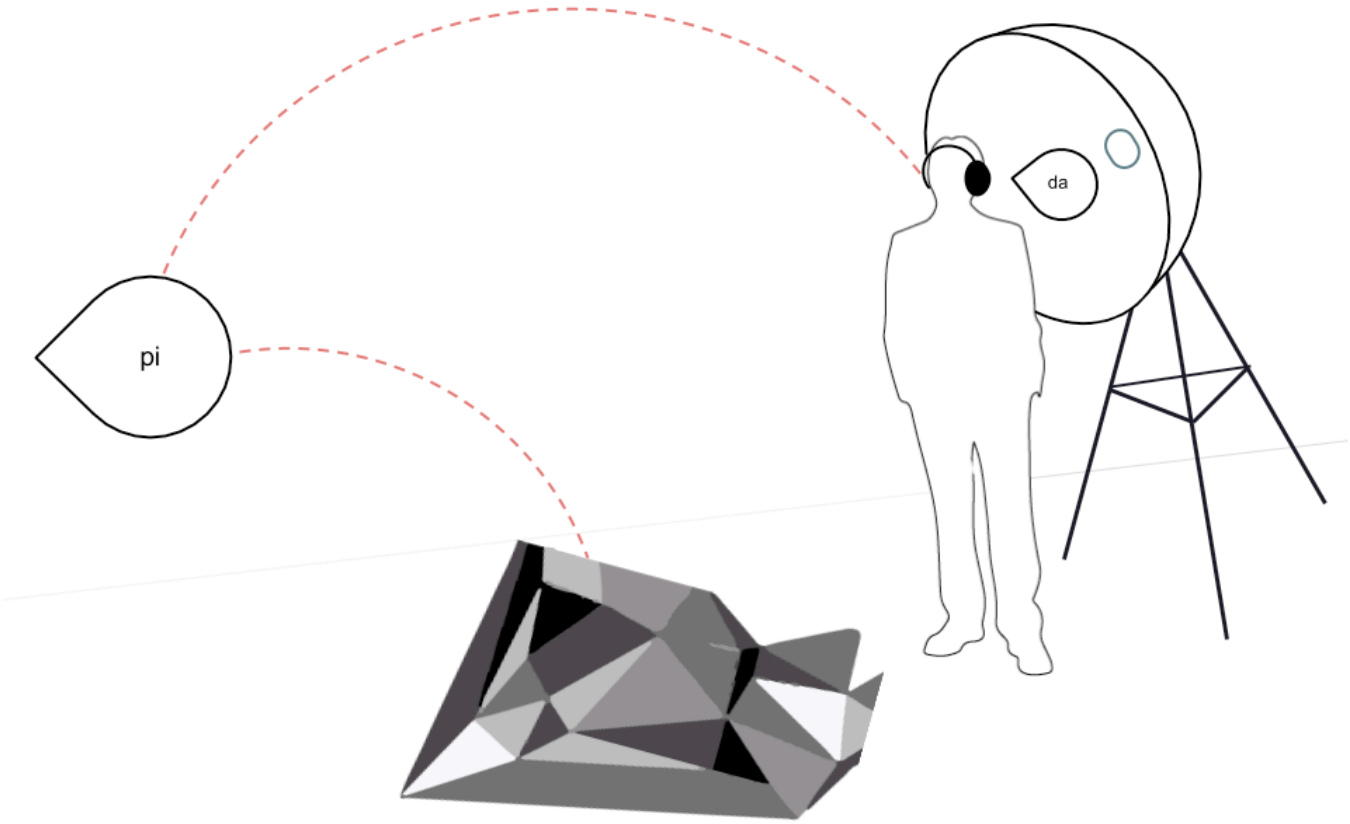
1. *A **call and response** system that activates an artificial language which evolves, based on participants' sonic contributions within a transceiving parabolic dish and a microphone, generating geometric real time visualizations on the floor.*

*2. **Stillness**: A **three-phase sound and visual projection** that explores the aesthetics of phase transitions and the poetic, ironic narratives of stillness as a precursor to interactivity.*

Call and Response



In the Call and Response installation participants mimic the communication dynamics between birds, evolving the patterns of an artificial language that emerges from the aggregation of human-bird calls. In birds, call and response patterns evolve from a spectral and grammatical synchronicity. The underlying structure of the system mirrors the scientific research in avian species that involves the effective transmission and reception of sounds that relate to aggression, seduction, proximity, presence of food and parental care. In the artistic installation the politics of attention and attraction are similarly played out, and in our exploration of human mimicking the bird songs we have observed the autonomous emergence of patterns as an immersive strategy for learning.



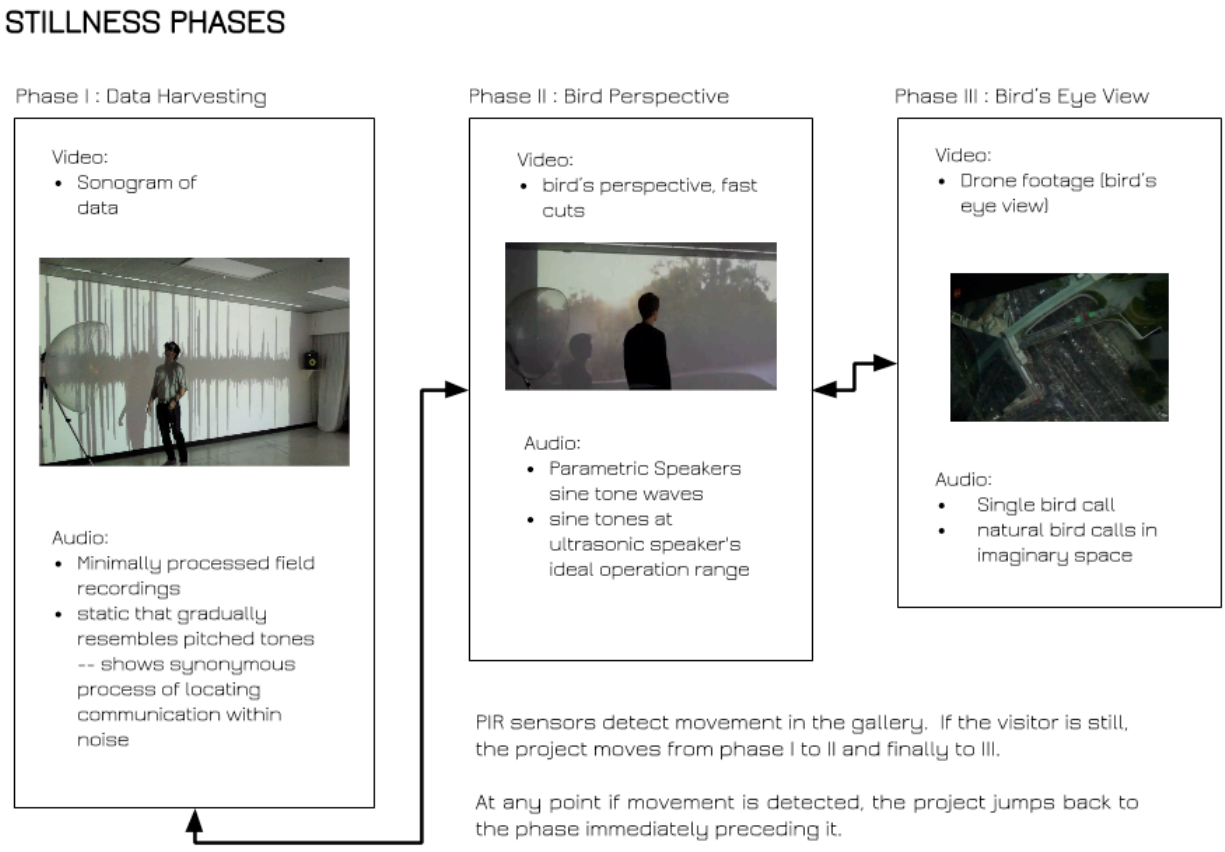
ARTIFICIAL ORGANISM
(floor projection)

Parabolic dishes spatially separate the gallery space making two transceiving stations at opposite corners of the room. The parabolic shape is a subtle but important visual symbol to acoustic science fieldwork, which almost always involves the use of parabolic shotgun microphones. In each transceiving station there is a pair of headphones and a microphone where people can communicate and contribute to the developing language. They are invited to make a call, and join the conversation. Their sounds affect the evolution of an artificial language that is being created and replayed when there is more than 2 people joining the system. When there is only one participant the system defaults to a loop, leaving the person talking to him/herself, and at that time, the language ceases to evolve.

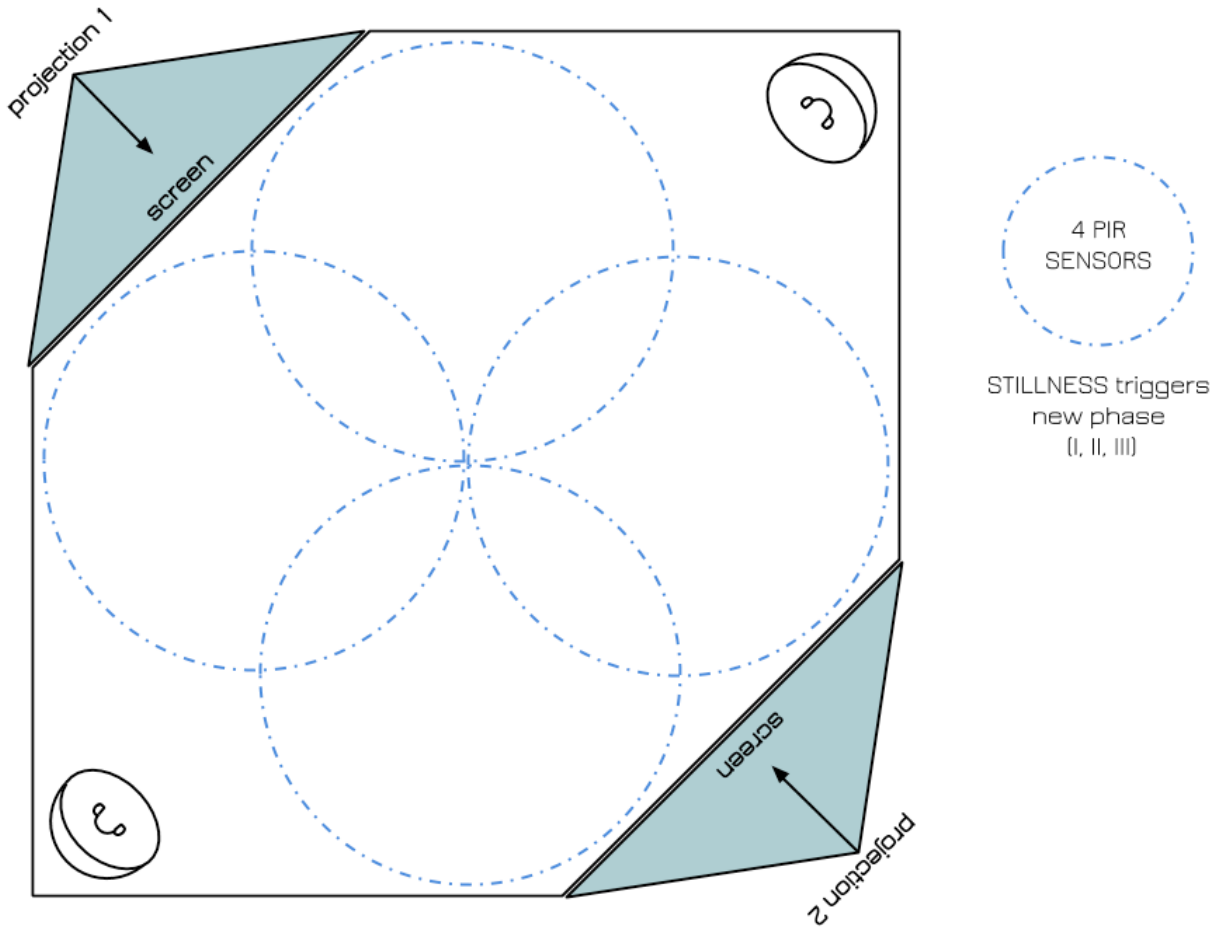
The artificial language becomes an audiovisual organism born from the birdsong and human mimicry making grammatical structures which emerge from conversations between birdsong field recordings collected by Taylor's group and human samples that are collected throughout the duration of the exhibition. The artificial sonic language evolves in unison with a growing diamond lattices that are projected on the floor across from one another, serving as a visual representation of this evolution.

Stillness

In the Stillness portion of the installation, a video projection moves between 3 audio-visual phases when the visitors are still and quiet.

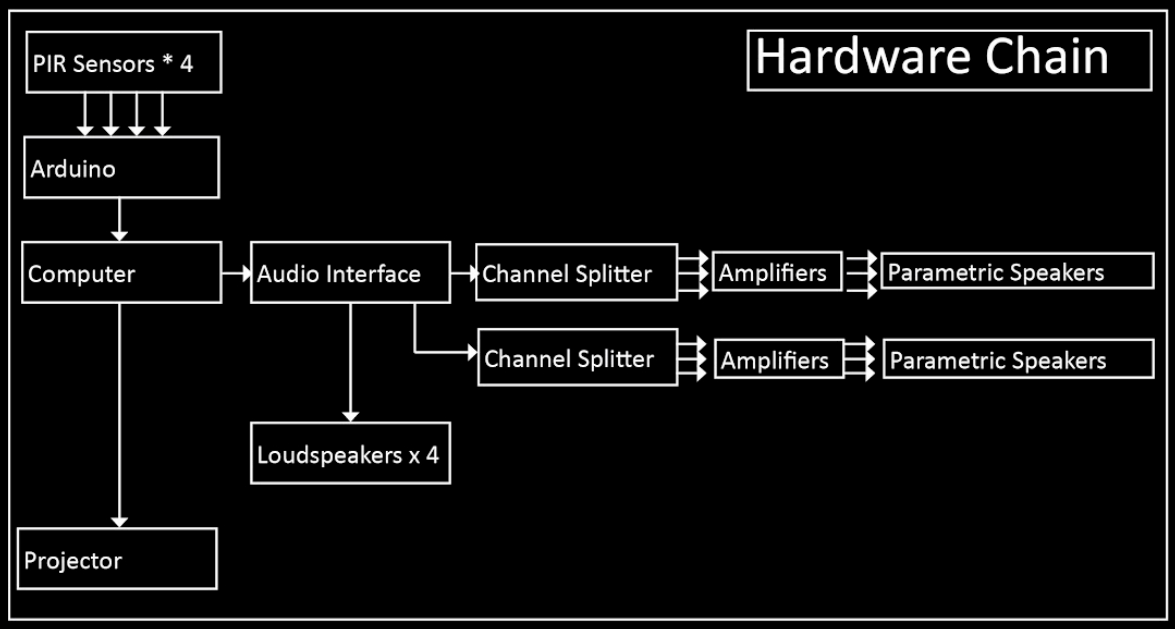


In the first segment, we use the existing scientific data of bird songs visualized in the form of a sonogram and network maps that scroll across the wall and the corresponding audio feed is adapted from a minimally processed field recording of the birdsongs. The installation transits to Phase 2 and 3 when the visitor remains still and assumes a more focused position of listening. In Phase 2, original bird-calls are manipulated and precomposed into artificial, "grammatically ambiguous" sounds. These collected arrays of sounds are then introduced into the installation. Phase 3 involves a contemplative look at the totality of the human species through aerial drone footage. Large masses of people (especially in political movements) contribute to narratives of chaos and order as the visitor is given a 'bird's eye' or planetary view of our special existence.



A motion detection system detects the stillness of the visitors within the areas in front of the sidewall video projections. The three phases advance depending on the observer's stillness in the space, only allowing them to experience the next phase if they are standing still and quietly fully aware of the changes in their environment. An array of 4 PIR motion sensors is aggregated through Arduino to track the visitors' movements in the space. When the visitors movement in the space slows down, the Arduino sends a trigger to the control center in Max MSP. The Max patch controls the video elements, at the same time sending OSC messages to a sound patch in SuperCollider.

SuperCollider controls an array of 24 parametric speakers, as well as 4 channels of full-range audio. Parametric speakers are utilized in a post-immersive soundscapes made through an aggregation of focused sounding objects that move around the space. This phase alludes to the spatial height of birds (and of the listener) and in creating this artificial environment, it sets the sonic backdrop to Part 1.



Equipment List

To Be Provided:

- 3 mac minis
- Projectors (5000 Lumen minimum)
- Loudspeakers (4 minimum)
- Cables (audio, video, usb)

Provided By Us:

- Specialized Cables
- Parametric Speakers (40)
- Audio interface (1)
- Channel splitters (2)
- Amplifiers (40)
- PIR sensors (4-6)

Software:
Max MSP, SuperCollider, Arduino, OSC, OpenFrameworks

Hardware: (Equipment List)

To be provided (subject to change)	Provided by us
3 mac minis Projectors (5000 Lumen minimum) Loudspeakers (4 minimum) Cables (audio, video, usb)	Specialized Cables Parametric Speakers (40) Audio interface (1) Channel splitters (2) Amplifiers (40) PIR sensors (4-6)