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Secret Reception

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ABSTRACT

Secret Reception combines art and bioacoustics to creatively engage the public in questions about sound reception in more-than-human worlds. This sonic art installation offers new paradigms for hearing through the design of haptic objects and tactile interfaces that use vibration to transmit sonic information. Drawing on scientific research that examines how insects detect sound through body parts, we transpose insect hearing to the human listening experience using sonic impulses that emulate the way insects receive them.

INTRODUCTION

Secret Reception is a sonic installation that combines art, bioacoustics and eco-musicology to creatively engage the general public in questions related to sound reception in the human and more-than-human worlds. This sonic art installation proposes new paradigms for understanding "hearing" or sound detection through the design and exhibition of tactile and haptic objects and interfaces that use vibration to transmit sonic information. *Secret Reception* expands the idea of what hearing is, and proposes sensory modalities not necessarily associated with conventional modes of human hearing. Drawing on scientific research that examines how insects hear or detect sound through a variety of body parts, we transpose insect sound detection to the human listening experience. Inspired by art and science, we provide the visitor with a haptic experience of sound impulses that emulate the way insects receive them while also possibly revealing interpretive melodic and rhythmic characteristics. (figure 1)

Figure 1. The artists interacting with Secret Reception. (photo credit: Mary Edwards)

Hidden Sounds

Our installation reveals that just as there are arthropod (insects and relatives) communities that are microscopic, cryptic, and unseen by us, there are communities that use unusual and unexpected communication mechanisms that are unheard by us. We may be able to learn from them and be inspired to broaden our own ability to hear in new ways.

Entomological research shows that insects communicate using sound detection required for survival and reproduction. Hearing apparati that evolved to communicate or detect predators, for instance, may occur on antennae, abdomens, wings, mouthparts, and other body parts. Just as sound waves enter our human ears and transform from vibration to mechanical movement to electrical impulses, insects also use audio transduction. However, their outer "ears" may be located on their antennae, as with mosquitoes, that vibrate when sound waves hit them. The vibration travels down the antenna and stimulates motion-receptive sensors in the Johnston's organ which, in turn, sends electrical impulses to the nervous system. The Katydid uses an acoustic vesical located in its legs and thorax. (Figures 2)

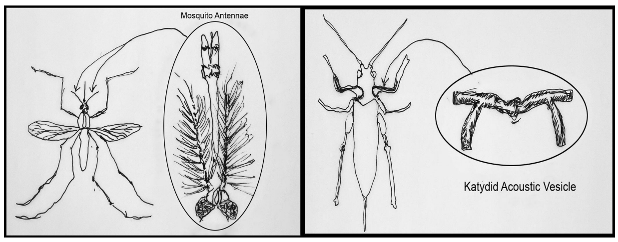

Figure 2. Mosquito antennae and katydid acoustic vesicle. Illustrations for objects and interfaces for Secret Reception. (Illustration credit: Kristine Diekman)

Moths provide another example. Some species have paired "ears" on their thorax. When sound waves hit them, they vibrate a tympanum that connects to two sets of receptors designed to evade other flying predators such as bats that use echolocation. The signals travel to the ganglion in the thorax which is then directly sent to the flight muscles to create a sudden change in flight trajectory to avoid echolocating predators such as bats.

Interaction Design

Our installation invites the human visitor to interact with various tactile and haptic sound and vibration emitting objects and surfaces. Hand drawn images of species-specific sound receptors created with conductive paint, when touched, complete the sound-triggering circuit in microprocessors that connect to high-energy Bluetooth speakers. The speakers are housed in small boxes laser-etched with representations of insect sound reproduction organs. Visitors pick up the boxes and hold them to parts of their bodies not normally used to "hear" such as the hand, elbow, jaw, thigh, and chest, while touching the sensor.

Our interest in creatively re-imagining human hearing is drawn from several sources, including direct experience with hearing impaired communities and research that suggests that skin vibrations improve auditory perception. For instance, studies have shown that adding wrist vibrations to the limited hearing of people with cochlear implants creates greater spatial hearing by providing missing haptic information (Fletcher, M.D., Cunningham, R.O. & Mills, S.R., 2020). (Figure 3)

Figure 3. Visitors to the installation interacting with senso. rs and boxes (Photo credit: Diekman/Pagac)

During a recent community-based pop-up sonic installation, created by Diekman and her collaborator Laura Nova, people with hearing impairments visited the installation in the public site. The installation was designed with tactile sensors embroidered with conductive thread that, when touched, triggered audio stories on small Bluetooth speakers. (Delicious Memories, 2011, Produced by Kristine Diekman and Laura Nova). (Figure 4)

The intention of Delicious Memories was to link tactility to listening to enhance deep listening and bring the listener emotionally and empathically closer to the audio story (Petkova VI, Ehrsson HH, 2008). Unable to hear the digital audio stories, the hearing-impaired visitors to the installation picked up the small Bluetooth speakers while touching the tactile sensors. Their joyful expression of inclusion into the sonic world through the two haptic forms of texture and vibration was evident.

Figure 4. Delicious Memories, 2021-2022. *"Delicious Memories" is an intergenerational storytelling workshop and media art installation that brings together older and younger New Yorkers to tell and connect stories utilizing craft and interactive technology. The installation and the performance stitches delicious stories together into a sonic multi-sensory communal tablecloth. The project draws on lived experiences through sensorial prompts about "delicious memories", those highly somatic and multi-modal experiences that are deeply embedded in our bodies. The experience of physically crafting creates a connection that activates and sustains dialogues between generations. While the project employs traditional craft techniques, it integrates them into contemporary digital technologies. Collaborators: Laura Nova and Kristine Diekman.*

CONCLUSION

Secret Reception invites participants to immerse themselves in eight different arthropod communication systems in a way that reaches deeper than, and beyond, their ears. *Secret Reception* further asks if we may be doing things, unknowingly, that interfere with these often unseen, often unheard arthropod communities after being given the perspective of experiencing the "feeling" of the sounds that they create. While we know, through research, that arthropods use acoustic modalities that rely on far-field, near-field, and substrate sound, there is concern that anthropogenic sound can interfere with these complex systems and impact behavioral elements such as communication, mating, and predator and prey detection (Raboin and Elias, 2019). For example, grasshoppers and camel crickets were found to be less abundant in areas with noise associated with gas extraction sites (Bunkley, 2017). What else might we be doing, sonically, that impacts unseen/unheard worlds? How can hearing like an insect change our human relationship to this otherwise secret world and to each other?

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All sounds used were either field recordings by Pagac, Diekman or were from fair use, public domain sources. Thanks to David B. Rothenberg for use of the water boatman recording.

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