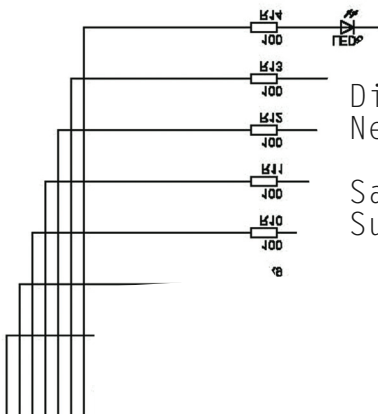


Science Gallery Dublin and
The League of Consciousness
Providers present:

MUSIC FOR SLEEPING & WAKING MINDS ⁽²⁰¹¹⁾

BY GASCIA OUZOUNIAN
WITH R. BENJAMIN KNAPP
AND ERIC LYON



Avant Première

Diapason Gallery,
New York City

Saturday 4 June -
Sunday 5 June 2011

NOTES

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Music for Sleeping & Waking Minds is perhaps not so much a musical composition as it is an auditory description of the states of mind of four individuals. During the course of one night, the four individuals, who form a sort of ensemble, fall asleep and awaken as they naturally would. As they do so, their brainwaves (which are monitored using specially designed EEG bands) generate sound. This sound emerges as a continuously evolving, dense electronic drone made up of multiple tones whose aural characteristics (timbre, spatial location, frequency, duration, periodicity, amplitude, etc.) evolve in simple and minute ways according to changes in brainwave activity.

The four members of the ensemble enter in turn, at about 10 minute intervals each, from the outset of the event. This allows listeners to aurally identify each member, as each is associated with a different combination of pitches upon entering the mix. These staggered entrances also allow listeners to observe the ways in which each member contributes to the emerging 'collective consciousness' that is being described in sound. This emergent consciousness -- one that is heard simultaneously within multiple states of attention (meditative, resting, sleeping, awakening, alert states etc.) -- can neither be predicted nor controlled. It evolves as a kind of dialogue between minds, a dialogue that is simultaneously 'conscious' and not.

In addition to the electronic sounds that are generated and processed by the ensemble's brainwave activity, there is a pre-recorded 'evening soundscape' that is played at the outset of the event, and a 'morning soundscape' that plays towards the end of the event.

These elements make up the basic aural content of *Music for Sleeping & Waking Minds*. However, this work is more concerned with perception and communication (specifically as these emerge within and between different states of attention) than it is with musical processes. How does our perception of sound change between different states of attention, and how is this shift experienced (physiologically, emotionally, etc.)? How does our perception of sound within different states affect our thoughts, dreams, and memories? How do we communicate these experiences, and what are the terms of our communications?

Although the experience of *Music for Sleeping & Waking Minds* is primarily an aural one, the sounds in it are designed not to draw the listener's attention, but merely to provide a field of activity upon which listeners may choose to focus their attention. In a sense, this is not a work 'to be listened to'.

For this first iteration of *Music for Sleeping & Waking Minds* the sounds are generally still, dense and ambient; the different stages of sleep and awakening are mapped such that there is always a co-relation between brainwave activity and resulting sound, though this relationship is abstracted to suit the purpose of restful sleep.

Music for Sleeping & Waking Minds is the second in a series of overnight works I have been developing in collaboration with a number of wonderful artists, musicians and engineers. The first, *EDEN EDEN EDEN* (2009, Berlin) featured a haunting meditation on light and thought by the filmmaker Chloe Griffin. *EDEN EDEN EDEN* was conceived of as a 'memory processing ritual', and consisted of continuously evolving patterns of sound and image; the programme notes read:

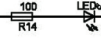
Aural and visual acts become chaotically resonant through their continual repetition. Members of the audience, who are invited to sleep during the performance, shift between waking and dreaming states. Afterwards, their memories coincide.

If the conceit with *EDEN EDEN EDEN* was that the collective experience of continuous/repetitive sound and image within different states of consciousness could enable coincidental, 'resonant' memories, the conceit with *Music for Sleeping & Waking Minds* is that communication can occur within multiple states of consciousness simultaneously, and that an intelligent, collective consciousness can emerge from this communication.

I am extremely grateful to R. Benjamin Knapp and Eric Lyon, my partners in the Biomuse Trio, for helping me develop *Music for Sleeping & Waking Minds*. They have been inspiring and generous collaborators, and this work is dedicated to them.

NOTES ON THE PHYSIOLOGICAL INTERFACE

R. BENJAMIN KNAPP



The essence of the technology development for Sleeping and Waking Minds involved re-inventing a “sleep laboratory” as a comfortable sleeping environment. We transformed sticky electrode montages into small ergonomic headbands. We coded the offline machine intelligence algorithms into real-time time signal analysis algorithms that could be used to directly drive the music. We made the sleeping mind into a musical instrument.

NOTES ON THE AUDIO INTERFACE

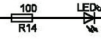
ERIC LYON



The auditory representation of the mental states of the performers relies on direct mappings of biosignals to parameters of a constantly changing 8-channel sound. The sound consists of sixteen tones of variable spectrum. Each performer influences four of these tones. The presence of alpha waves in a given performer applies tremolo to the four tones assigned to that performer. Delta waves affect the timbral complexity of individual tones. Spindles are articulated by sending enveloped tones into delays with feedback. The extreme simplicity of the sonic mappings allows any patterns that emerge from changing biosignals of the performers to be heard as clearly as possible during the performance.

STARING AT THE SUN: ON MUSIC AS A STATE OF BEING

GASCIA OUZOUNIAN



Music is an image of the mind, and its realization is a view to the states of mind, and the states of being, of musicians. In this sense, it is among the most precious and vast records -- as much so as the fossil record -- of humanity, and of individual humans.

At the same time, music necessarily operates within myriad, dynamic networks of relationships -- between musicians, listeners (those who are said to receive music, although the role of the listener is often more creative than is typically acknowledged), acts of sound making (what is often referred to as musical performance, but what often occurs outside conventions of performance, like the singing of lullabies and hymns), acoustic environments, social and cultural environments, technologies of transmission, etc. -- and does not, in a fundamental sense, exist outside of these networks. When Gertrude Stein wrote of Oakland that 'there is no there there', she could have equally written of music that 'there is no music in music.' The record that is music -- a record of the self, a record of the self in relation to others, a record of the self in relation to moments, histories, and ways of being -- is only useful in a limited sense, since these networks are continuously in flux, and always contingent upon other networks, which are similarly unstable.

Still, music-as-record is a strikingly undermined concept within the discourses, both academic and popular, that describe and inform musical practices.

These discourses are principally concerned with the mechanics of music: its construction (or composition), and its execution (or performance). With regards to the former, it is generally agreed that this construction is made up of parts (frequencies or notes, durations or rhythms, amplitudes, etc.) -- parts that are assembled during the time of composition, and that may subsequently be disassembled for the purposes of analysis. With view to the latter, these discourses are primarily concerned with technique: what characterizes a 'good' performance versus a 'bad' performance, not unlike the way in which celebrities are said to be more or less beautiful.

By contrast, if music is conceived of as a record (of states of being, of states of mind, etc.) the parameters of these discourses must necessarily be reconsidered, as must those of the musical practices they address. A voice becomes valued not for its ability to perform vocal acrobatics, or execute a score faithfully, or even for 'the way it sounds,' but for what it reveals, in a material sense, about its owner.

Certain musical traditions are more closely aligned with the idea of music as a record of human existence. In his writings on improvisation as a way of life, George Lewis has referred to Charlie Parker's statement that, 'If you don't live it, it won't come out your horn'. Parker's statement suggests that music does not exist outside the life which creates it, and that the qualities of this life are somehow apparent (are audible) within the music itself.

Parker's statement also tells us something about jazz music: namely, that this is a tradition which privileges lived experience as an integral part of the musical process.

How, then, to emerge from this premise -- that music reveals aspects of lived experience -- to understanding what it is that music reveals? How to perform this wild act of translation, from listening to knowing? Is this even a kind of translation, or are listening and knowing fundamentally intertwined, not distinct processes but conditional ones, like eating and digestion?

Last year I took part in an event that unexpectedly raised these questions. *Biospaces* was a new (and still evolving) composition for violin, bio-musician and listeners; it was developed by the engineer R. Benjamin Knapp and the composer Eric Lyon. In this work, a violinist improvises a slowly evolving melody. Several audience members are wired to sensors that measure their physiological responses (specifically, their heart rate and their galvanic skin response, or the ability of the skin to conduct electricity). Knapp, the inventor of the biomuse, an instrument that combines different sensors that glean physiological data and route this information to digital musical interfaces, is also featured in *Biospaces*. Wearing the biomuse, Knapp triggers the advancement of the composition through different musical sections and modes of interaction.

The resulting music, which is both acoustic (deriving from the violin) and electronic (deriving from digital audio signal synthesis), is produced through the interactions of the biomuse performer, the violinist, and the wired listeners. In the most basic terms, the violinist plays a melody and the listeners harmonize this melody through their physiological responses; the biomuse performer determines the ways in which these interactions result in different kinds of sound.

Knapp, Lyon, and I presented *Biospaces* on several occasions during a series of workshops and concerts in New York City in January 2010; we offered these in part to learn more about bio-music compositions, in which music is derived from physiological signals, and is therefore contingent upon factors that are impossible to gauge within studio conditions. In performance settings, conditions like nervousness are linked to physiological responses that may never be present within the studio. To a certain extent, such responses may be predicted and accounted for. It is understood, for example, that the onset of a performance compels some amount of anticipation and therefore may result in a faster-than-normal heart rate on the parts of performers and listeners. However, the finer levels of physiological responses, those that are tied to emotions that are felt in response to actual music, are less obviously, if at all, predictable.

When we moved *Biospaces* from the studio into live performance the experience took all of us by surprise. The feedback loop between the violinist and the wired listeners turned out to be so tightly wound that it was impossible to say who, if anyone, was driving the evolution of the music. Every slight change in the violin melody (or violin sound) resulted in a distinct, and vivid, response in the harmony, and vice versa. The two were inextricably linked. This was surprising from my perspective (i.e. a performer's perspective) in part because it made clear the extremely fine attention with which audiences can, and do, listen. As a violinist, I am not always aware of the extent to which audiences can hear; I do not necessarily know whether a slight change in bow pressure, speed or placement is actually being heard, and if it is being heard, whether it means anything ('means' in the sense that it is understood by the listener as being musically significant). *Biospaces* made apparent that even the most negligible changes in sound are indeed heard, and furthermore that these changes impact upon the listener in some measurable way.

Biospaces also made apparent the fact that even the most slightly perceptible sounds have a value that extends beyond the realm of the musical (or the sonic), and belongs equally, and perhaps more saliently, to the realm of the emotional.

In the brief moments of its realization, the work was most effective, in my opinion, as an emotional, and not a strictly musical, experience. The listeners and the musicians were joined in a shared emotional space, one in which feelings -- their becoming, their development, and their effects upon other feelings -- were fully sensed and, perhaps, fully understood.

This rich emotional counterpoint contrasted with the relatively static musical 'content,' which, if you were to retroactively notate it, would consist of a few very long notes and chords whose pitches, amplitudes, and timbres shifted continuously in minute ways.

This experience was akin to the profoundly intimate, almost mystical, experience of looking into another person's eyes for very a long time, and looking in such a way that you begin to mirror one other's souls. It was similar to that but also communal, shared among dozens of people, most of whom were strangers to one another.

I imagine that every powerful experience of music operates in a similar way, i.e. entails an exchange that touches upon the fundamentals of existence and being. Within such experiences, something that is otherwise unknowable is revealed about the musicians, the listeners, and about humanity in general. Such exchanges, in the sense that they facilitate the creation of such knowledge, are miraculous, even though they are not uncommon.

The history of music, even the relatively short history of recorded music, is filled with miracles. Billie Holiday's voice is one of them. To listen to Holiday, and indeed voices as varied as those belonging to Nico, Nina Simone, Tigran Mansurian, and countless others, known and unknown, is to hear the dimensions of lives that repeatedly, and often against better judgment, touched the boundaries of existence, and delineated those boundaries for others to hear.

The history of music, even in its miraculous form, is an embarrassment of riches. It is an embarrassment of riches and also of people who, in their attempts to cultivate the selflessness that is essential to facilitating such exchanges, risked their very existence, in the way that a person might lose her sight if a person stares at the sun for too long.

Edgar Allen Poe once wrote that, 'I know that indefiniteness is an element of the true music - I mean of the true musical expression,' and suggested that this indefiniteness was linked to music's 'spiritual effect.' I would propose that the indefiniteness Poe describes is not linked to tonality, rhythm, structure, or any other musical parameter that can be understood as being definite or indefinite. Rather, the indefiniteness of music lies within the cloud of unknowing that is at the heart of its existence, and ours. To approach this cloud is to stare at the sun far past the point of blindness, until you begin to mirror its soul.

ABOUT THE BIOMUSE TRIO



The Biomuse Trio (Eric Lyon, R. Benjamin Knapp, Gascia Ouzounian) was formed in 2008 to perform computer chamber music integrating traditional classical performance, laptop processing of sound, and the transduction of bio-signals for the control of musical gesture. The work of the ensemble encompasses hardware design, audio signal processing, biosignal processing, composition, improvisation, and gesture choreography. The ensemble is based at the Sonic Arts Research Centre (SARC) at Queen's University Belfast.

The Biomuse Trio has given lecture-performances across Europe and North America, at venues including STEIM (Amsterdam), NIME 2009 (Pittsburgh), Diapason Gallery (NYC), Issue Project Room (NYC), TheatreLab (NYC), Ormeau Baths Gallery (Belfast), Brunel University (London), and Science Gallery Dublin. In 2010 the Biomuse Trio was a featured ensemble at CHI, the premier international conference in the field of computer-human interaction.

The League of Consciousness Providers was formed in order to present events that highlight processes of consciousness formation and development.

ACKNOWLEDGEMENTS



Thank you to Science Gallery Dublin for facilitating this event, and to the Arts Council of Northern Ireland for its generous support. A special thanks to Michael Schumacher of the Diapason Gallery for programming *Music for Sleeping & Waking Minds* in his wonderful space. Thanks to all the members of tonight's ensemble, who include our colleagues in bio-music research, Javier Jaimovich and Niall Coghlan of the Music, Sensors and Emotions group at the Sonic Arts Research Centre. Huge thanks to Stephen Maurice Graham for his wonderful poster design, and Conan McIvor for lending us his brainwaves and designing the programmes. Warm thanks to Isobel Anderson and Elizabeth Hoffman for their support, and to Karen Ouzounian and Nick Gallas, always!



UPCOMING EVENTS



Saturday, 25 June 2011. *Music for Sleeping & Waking Minds*. BEAM Festival (Brunel Electronic and Analog Music Festival), Brunel University, London. Curated by Sarah Niccols.

Sunday, 26 June 2011. Workshop with the Biomuse Trio on physiological and emotional interfaces in music. BEAM Festival.

19-21 August 2011. *Music for Sleeping & Waking Minds*. Einstein's Garden, Green Man Festival, Wales.