

# IMPILO



Field recordings with computer assisted processing

**IMPILO** meaning life in Zulu is based on various drawings and stories my 2 children used to draw and tell me. Our family holidays were spent in different parts of South Africa that had a prominent wildlife presence. Observations would start in the early mornings and late afternoons, we left the camp observing and enjoying nature. In the evenings sitting around a campfire created a perfect environment for story telling. The Sony minidisk recorder was switched on at all times recording nature, wild life, insects the stories told, the sounds of toys, of cell phones, voice, the TV and radio, the silence?

Composing **IMPILO** involved creating and attaining an organic environment and a balance between nature and digital media.

I researched different possibilities of how e.g. a toy would become an integrated part of nature and of the composition, I treated the sounds in **IMPILO** like a virtual orchestra were I was the conductor and each sound an instrument playing an equally important role in the construction of the final product.

**IMPILO** was created on low budget PC speakers to enhance the filtration process and reduce clarity of hearing this process challenged my listening capabilities.

|             |  |
|-------------|--|
| Composition | <b>Impilo</b>                                      |
| Composed    | 2001   |
| Duration    | 29min 58 seconds                                   |
| Description | Field Recordings with Computer assisted processing |
| Composer    | Dimitri Voudouris                                  |
| Country     | Greece/South Africa                                |

## Composer Biography

**Dimitrios Voudouris** was born in Athens Greece, his parents immigrated to South Africa in the mid-60s. He obtained a Bachelor of Pharmacy degree at the University of the Witwatersrand in 1986; he further studied Science of Religion, Socio-Cultural Anthropology and Philosophy at the University of South Africa.

A composer whose technical and theoretical infrastructure has been constructed chiefly on the basis of his own personal inquiry, he composes for acoustic instruments and for electronic sound sources, which he usually operates himself.

In the late 1990s started composing and in 2003 two of his works **IMPILO** and **NPFAI.1 [new possibilities for African instruments]** were selected and premiered at the electronic music gallery an installation created to commemorate the 75th birthday of German avant-garde composer Karlheinz Stockhausen] as part of the New Music Indaba's annual events at Grahamstown arts and music festival. In the same year he became a board member of New Music SA and director of electronic music [an organisation whose aims are to promote contemporary New Music in South Africa-[www.newmusic.org.co.za](http://www.newmusic.org.co.za)], he is currently the official organiser of **UNYAZI** the first Electronic Music Symposium/Festival to be held in South Africa and Africa in 2005.

In 2004 the work **PRAXIS** was chosen to represent South Africa at the ISCM 2005 in Croatia.

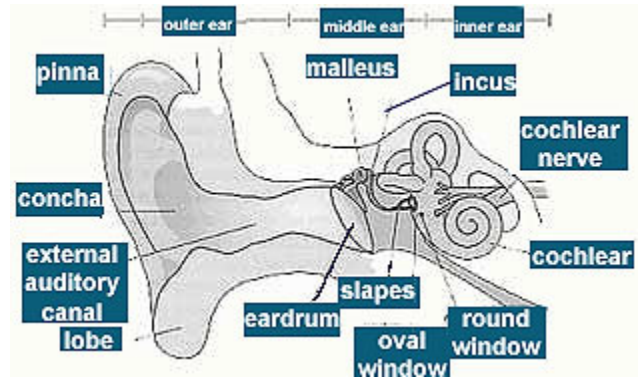
His compositions are constructed on computer where he has a strong interest in exploring Africa in its cultural whole. At the NewMusic Indaba 2004, 3 compositions **Sizobonana, IMPILO and NPFAI.1** were selected and performed live as part of composing Africa series that included works by Kevin Volans, Michael Blake etc

Five of his compositions have been selected by a prestigious American record label POGUS Records for release on cd in late 2005.

He composes through the use of notation and graphic scores working with multimedia including dance and theatre. His interest and self study has led him to research subjects concerning the survival of music in the 21st century and the impact that media and technology has on the composer with relation to sound.

## Physiology of the human ear

When we hear a sound, what our ears are actually doing is converting the rapid fluctuations in air pressure that make up a sound wave into neural impulses. The human ear comprises three fairly distinct sections; the outer ear, the middle ear and the inner ear. The outer ear funnels sound waves through the ear canal to the middle ear. In the middle ear, the sound waves meet the tympanic membrane (eardrum) causing it to vibrate. Three bones in the middle ear - the malleus, the incus and the stapes - transmit vibrations from the eardrum to the inner ear. In the inner ear, the cochlea converts the vibrations to nerve impulses. Finally, the auditory nerve receives the messages which have been translated into nerve impulses by the ear and carries them to the brain where they are interpreted as sound.



Diagrammatic representation of the human ear –**diagram1**

Unlike our eyes we cannot close our ears thus we are continuously subjected to a huge number of different types of sounds even when we sleep.

Hearing sounds every single day of our life, prevents us from paying attention to the many aspects of the experience. Visual distractions also play a role in blocking that experience, the nature of sound, the reasons for our hearing anything at all and the mechanics underlying the sensation. It is not entirely clear how sound is actually generated in physical objects, why different objects do not all sound alike or how all this relates to our sensory apparatus. When taking a closer look at sound as a physical phenomenon, many interesting characteristics of sound come to proper focus. The relevant topics include the wave characteristics of sound: diffraction, reflection, interference and so on. Taking into account the peculiarities of the human sensory organ and the psychology of perception in general, one is taken into the field of psychoacoustics—the study of human auditory perception and its underlying mechanisms.

Human beings have ears that are relatively small compared to the wavelength of audible sound—we can with good accuracy say that ears are point like with regard to sound fields. Thus few humans even fully comprehend the real, complex vibration patterns that occur in three-dimensional spaces—evolution has not equipped our brain to do such analysis. Different animal species however have different shaped ears and although the ears are point like with regards to the sound field there frequency range varies allowing for a different comprehension of audible space than that of humans.

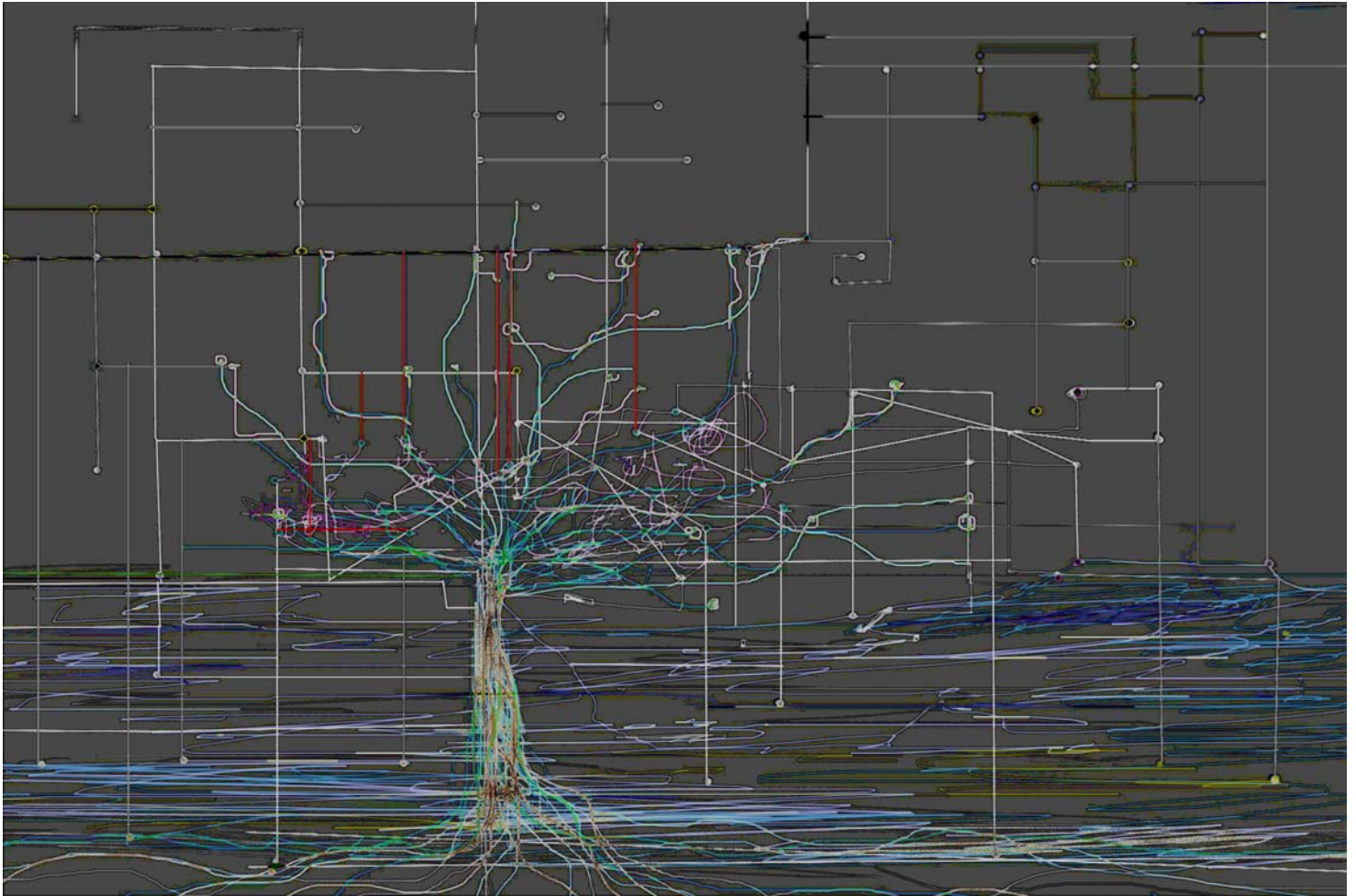
From the point of sound emission to the point of the final experience in the human brain keeping in mind the complexity of events occurring by sound diffraction, reflection, absorption, resonance, refraction and interference which are continuously occurring. What would happen if it was possible to amplify the ultimate surround sound system that nature has to offer? How would this phenomenon interfere with man's way of coping in the daily procedures, what life adjustments would need to be made, would the way we pay attention to sound change, would our appreciation and acceptance of organized sound [music] be very different?

## Dissecting the listening experience.

Sound perception includes how we listen, our psychological responses, and the physiological impact of music and sound on the human nervous system. In realizing **IMPILO** an analysis of psychoacoustics was vital as terms music, sound, frequency, and vibration are interchangeable, because they are different approximations of the same essence.

I found that slightly detuned tones can cause brain waves to speed up or slow down which is a physiological response to sound in addition, soundtracks that are filtered and gated (this is a sophisticated engineering process) create a random sonic event. It triggers an active listening response and thus tonifies the auditory mechanism, including the tiny muscles of the middle ear. As a result, sounds are perceived more accurately, and speech and communication skills improve. While a psychological response may occur with filtered and gated sounds, or detuned tones, the primary effect is physiological, or neurological, in nature.

In addition to its critical functions of communication and balance, the ear's primary purpose is to recycle sound and so recharge our inner batteries thus sound is to the nervous system what food is to our physical bodies: Food provides nourishment at the cellular level of the organism, and sound feeds us the electrical impulses that charge the neo-cortex.



**diagram 2**

Sketched diagram of *Brachychiton* : African flame tree + environment- avenues of communication

## IMPILO: a psycho acoustically-designed acousmatic fantasy

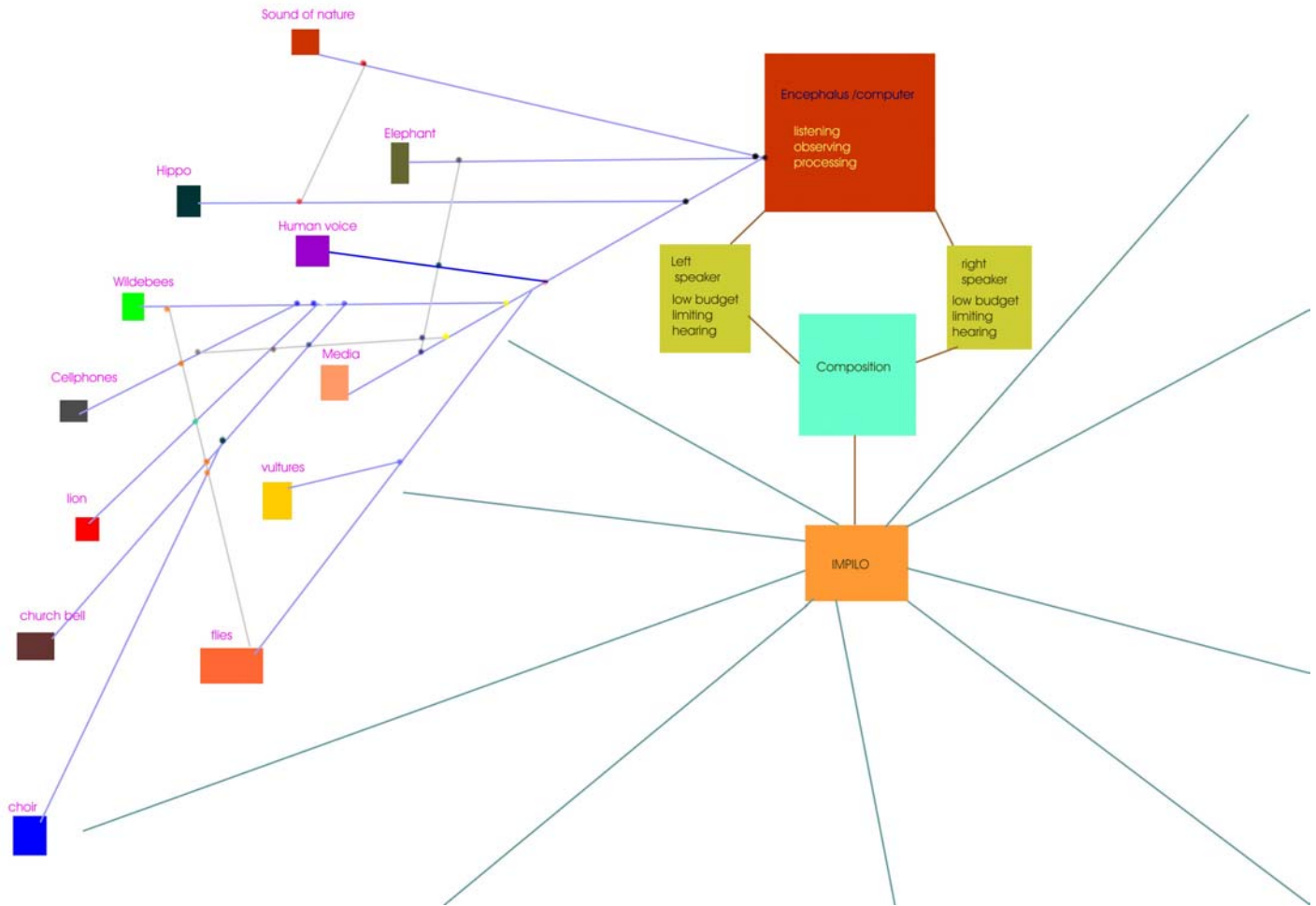
Its creation revolves around the following concepts and techniques

Resonance (tone)

Entrainment (rhythm)

Sonic Neurotechnologies (highly specialized sound processing)

Intentionality (focused application for specific benefit).



**IMPILO** design with sound interaction patterns – **diagram 3**

*Impilo is designed to give back to nature what was taken out of it in the process of creating an acousmatic fantasy.*

## RESONANCE & ENTRAINMENT

Consider the following: Anything that moves has a vibration. Though invisible, every aspect of our material world at the atomic level moves constantly. Wherever there is motion, there is frequency. Though inaudible at times, all frequencies make a sound. All sounds resonate and can affect one another. In the spectrum of sound - from the movement of atomic particles to the sensory phenomenon we call music - there is a chain of vibration:

- All atomic matter vibrates.
- Frequency is the speed at which matter vibrates.
- The frequency of vibration creates sound (sometimes inaudible).
- Sounds can be molded into music.

This chain explains the omnipresence of sound.

Resonance is the single most important concept in understanding the constructive or destructive role of sound in your life. Entrainment, sympathetic vibration, resonant frequencies, and resonant systems all fall under the rubric of resonance

Resonance can be broadly defined as "the impact of one vibration on another." Literally, it means "to send again, to echo." To resonate is to "re-sound." Something external sets something else into motion, or changes its vibratory rate. This can have many different effects some subtle and some not so.

From icebergs to airport construction to the human body, soundwaves have the capacity to alter, to actually shift frequency. Simply put, sound is a powerful - yet often ignored - medium for change.

Another fascinating and important aspect of resonance is the process of entrainment. Entrainment, in the context of psychoacoustics, concerns changing the rate of brain waves, breaths, or heartbeats from one speed to another through exposure to external, periodic rhythms.

The most common example of entrainment is tapping your feet to the external rhythm of music. Just try keeping your foot or your head still when you are around fun, up-tempo rhythms. You will see that it is almost an involuntary motor response. However, tapping your feet or bopping your head to external rhythms is just the tip of the iceberg. While your feet might be jitterbugging, your nervous system may be getting a terrible case of the jitters!

Rhythmic entrainment is contagious: If the brain doesn't resonate with a rhythm, neither will the breath or heart rate. In this context, rhythm takes on new meanings. Not only is it entertaining, but rhythmic entrainment is a potent sonic tool as well - be it for motor function or other autonomic processes such as brainwave, heart, and breath rates. Alter one pulse (such as brain waves) with music, and the other major pulses (heart and breath) will dutifully follow.

When it comes to the intentional applications of music, the entrainment effect completes the circle of the chain of vibration:

atomic matter --> vibration --> frequency --> sound --> sympathetic vibration (resonance) --> entrainment.

Music alters the performance of the nervous system primarily because of entrainment. Entrainment is the rhythmic manifestation of resonance. With entrainment, a stronger external pulse does not just activate another pulse but actually causes the latter to move out of its own resonant frequency to match it.

Understanding the interlocking concepts of resonance and entrainment enables us to grasp the way external tone and rhythm can heal or create havoc. Sound affects glass and concrete as well as brain waves, motor response, and organic cells.



## **SONIC NEUROTECHNOLOGIES**

The sound construction of **IMPILO** involved the use of effects such as filtration [using multi-band compressors] and gating [sound altering between low and high frequencies]. The effects are felt on a psychological, neuro-developmental, and physical level. As **IMPILO** uses binaural frequencies, listening through stereo headphones to slightly detuned tones (i.e., sound frequencies that differ by a prescribed number of Hz), sonic brainwave entrainment takes place.

As binaural frequencies facilitate a specific range of brainwave states [may assist in areas such as pain reduction, enhanced creativity, or accelerated learning] my intentions were to use such frequencies so as to create a balanced listening experience for the listener when involving nature and artificially created sounds so that the final product would be an organic aural experience.

## **SOUND STIMULATION WITH FILTRATION/GATING AS USED IN IMPILO**

In the broadest definition, sound stimulation can be defined as the excitement of the nervous system by auditory information. Sound stimulation auditory retraining narrows the focus. In this context, a precise application of electronically processed sound, through headphones, can have the effect of retraining the auditory mechanism to take in a wider spectrum of sound frequencies. An ear that cannot process tone properly is a problem of great magnitude.

- Auditory tonal processing may be defined as the ability to differentiate between the tones utilized in language.
- Auditory sequential processing is the ability to link pieces of auditory information together.

Auditory tonal processing is a basis for more complex levels of auditory sequential processing. Auditory sequential processing is the ability to receive, hold, process, and utilize auditory information using our short-term memory. As the foundation for short-term memory, Auditory sequential processing is one of the building blocks of thinking.

## **Summary of terms used**

- Filtration means the removal of specific frequencies from an existing sound recording, be that the music of Mozart or a recording of a voice. Through the use of sound processing equipment, it is possible to isolate and mute certain frequency bandwidths. With filtration, any part of the low, mid, or high end of a recording can be withdrawn and reintroduced at will. On a visual level, imagine erasing the bottom part of a picture and then eventually drawing it back in. This is filtration.
- Gating refers to the creation of a random sonic event. This is accomplished by electronically processing a soundtrack so it unexpectedly jumps between the high and low frequencies. While not always pretty to listen to, the net effect of this sound treatment is an extensive exercising of the muscles of the middle ear. The combined process of filtration and gating creates a powerful auditory workout. And for good reason! The middle ear mechanism must work very hard to translate the complexity of the "treated" incoming sound.

## The Children's Gallery

A series of pictures that my children contributed in the making of **IMPILO**



Alexandra Voudouris [6 years old] - embrace





Angelika Voudouris [6 years old] -Sun/Plants/Flowers/Air



Alexandra Voudouris [4 years old] - creatures





Angelika Voudouris [5 years old] - Dogtoy

## Listening suggestions when listening to IMPILO

- I recommend that **Impilo** be listened to in a total darkness; introducing light or visuals would distract the listener's aural experience.
- For out-door listening on headphones adjust volume so that external sounds around the listener can interact with IMPILO.
- For outdoor listening without headphones play on portable player adjust volume so that IMPILO can interact with the sounds of nature.

### Artwork

Angelika and Alexandra, Dimitri Voudouris

PDF document : Dimitri Voudouris 2002

**Created at : A New Music Research Studios**

Music composed , produced, sound engineered by Dimitri Voudouris

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### **SAMRO**

*South Africa 2002*

