

Title: Cardiomorphologies

Credits:

George Poonkhin Khut:
instalation concept, direction and sound design

Lizzie Muller:
curatorial research & development, direction, and
interaction design

Greg Turner:
software development, data analysis & visualisation (2005)

John Tonkin:
software development, data analysis & visualisation (2004)

Form:

Interactive, breathing and heart-rate controlled video
projection with four-channel or stereo audio

Duration:

Individual sessions, one person at a time, maximum
duration thirty minutes per person. Longer interactions by
negotiation. Each interaction is conducted and supervised
by the artist, George Khut or a trained gallery assistant.

Short description for promotional copy:

An interactive work exploring processes of body-mind
orientation using breath and heart rate biofeedback.

100 Word description of the work:

'Cardiomorphologies' is an interactive installation
that enables participants to explore aspects of their
own psychophysiology, with the aid of a custom
designed biofeedback artwork. Audiences interact with
Cardiomorphologies on an individual basis for periods of
up thirty minutes at time, supervised by the artist George
Khut. Breath and heart rate data collected by non-intrusive
sensors are used to control a large video projection
consisting of a series of halo-like concentric circles that
pulsate and blush in time with their own breathing and
heart rate patterns. Audiences literally 'search their heart'
using the artwork to observe subtle interactions between
their own mental, emotional and physiological processes.

For further information, images and documentation, contact George Poonkhin Khut

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AUSTRALIA

What happens during a typical interaction?

On entering the gallery, visitors are greeted by the
receptionist/gallery attendant, who tells them about the
work and how they can participate in it. The receptionist
leads the participant into the space, and they are greeted
by the operator/artist.

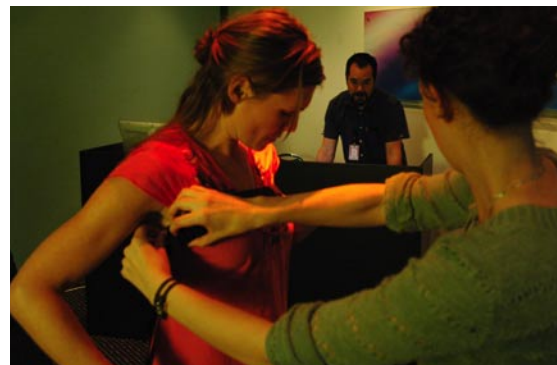
The operator explains how the two sensors will be
recording their heart and breathing movements, and
assists the participant with putting on the breath sensor:
a belt shaped device that is worn around their upper or
lower abdomen.

The participant then sits down in the reclining chair. The
breath sensor will usually need additional adjustment
to fit to the shape of their body in the reclining position.
Participants observe the artwork responding to their
breathing during this fitting process, and learn how the
work responds to different types of breathing.

The participant then takes hold of two small cylindrical
heart rate sensors, and after 30 seconds they will start to
hear their pulse transformed into a deep sub base throb.

After five minutes participants can choose to enter into
the first of two experiments into psychologically mediated
changes in heart rate patterning. Participants are invited
to invoke some form of intensely felt positive emotion/
sensation (i.e. resting on a beach, being with loved ones
etc.) for a period of five minutes; examine the state of the
work; and then in their own time, invoke a contrasting
mentally demanding process or scenario (i.e. math
calculations, detailed technical procedure, or difficult social
interaction) for another 5 minutes; examine to what extent
this activity alters their heart rate and breathing patterns as
revealed through the art work.

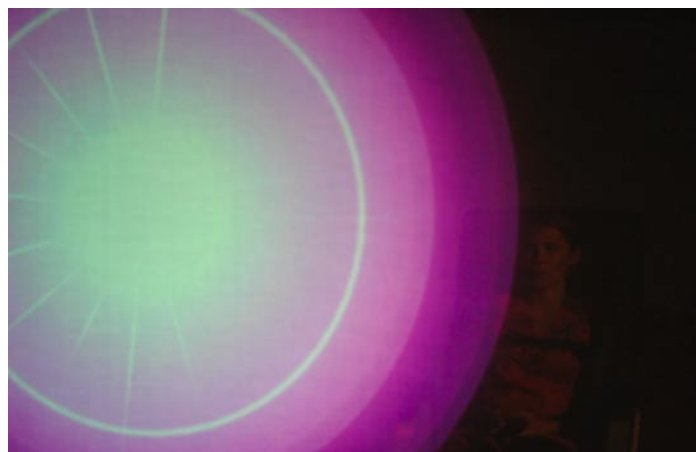
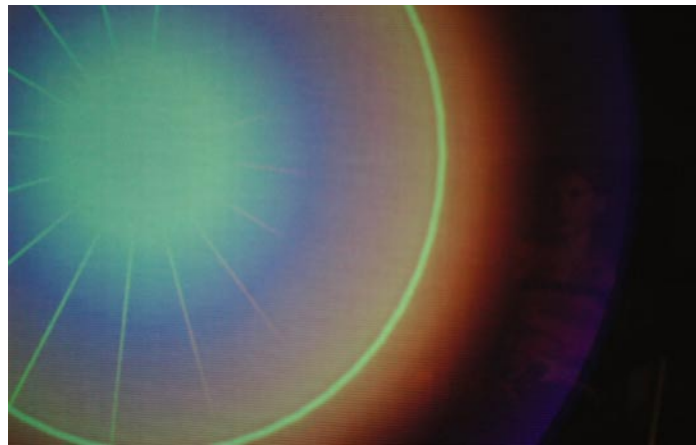
Participants can conclude their interaction at anytime by
placing the heart sensors down onto the footstool before
them. If they have not concluded their interaction after 25
minutes, the operator will manually fade out the video and
sound feedback to signal the conclusion of the work.



Documentation of Cardiomorphologies 2, as exhibited
at Powerhouse Museum Sydney, Beta_Space gallery,
14-21 September 2005: showing Lizzie Muller assisting
participant with fitting of breath movement sensor.
All photographs by Greg Turner.

Cardiomorphologies, 2006

George Poonkhin Khut with Lizzie Muller & Greg Turner



Documentation of *Cardiomorphologies 2*, as exhibited at Powerhouse Museum Sydney, Beta_Space gallery, 14-21 September 2005: views of video projections controlled by breath and heart related data. All photographs by Greg Turner.

Cardiomorphologies, 2006

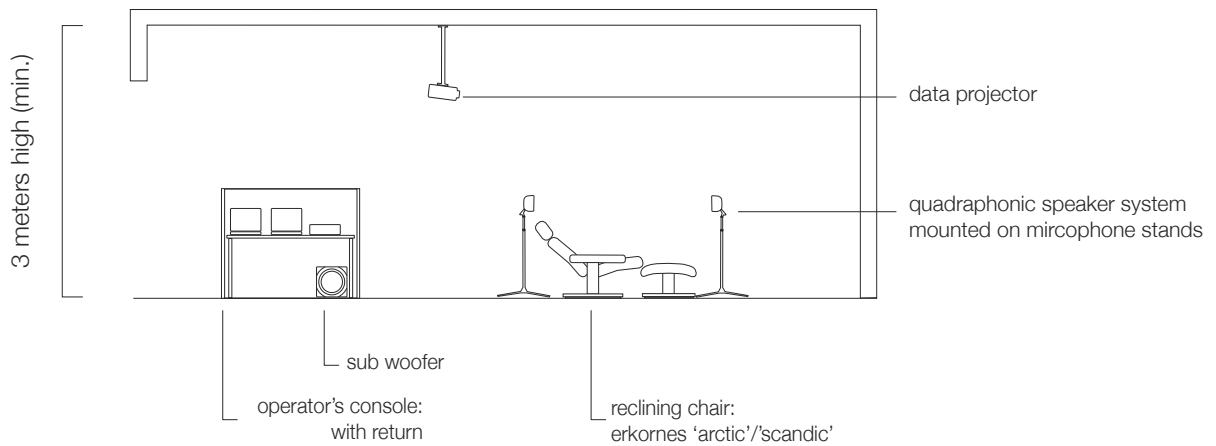
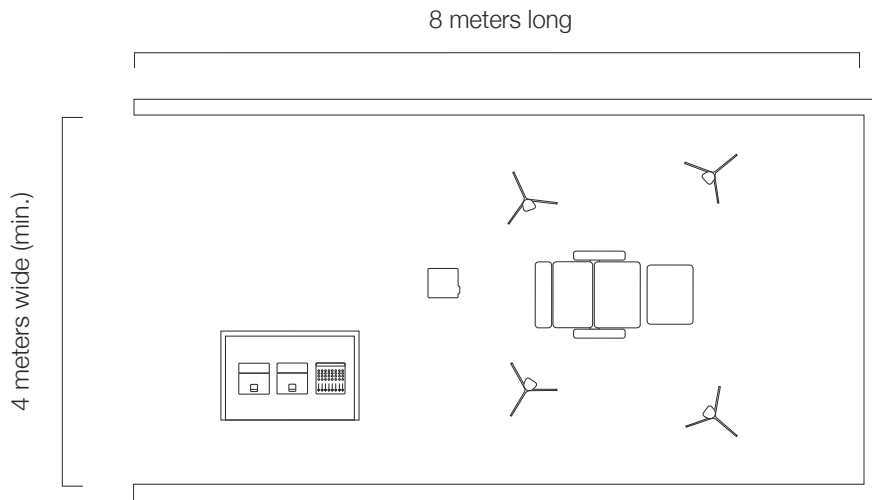
George Poonkhin Khut with Lizzie Muller & Greg Turner



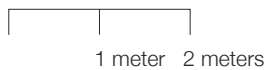
Documentation of *Cardiomorphologies 1*, as exhibited at Performance Space, Sydney, June-July 2004: views of installation with visual interfaces developed with John Tonkin. Photographs by Julia Charles.

Cardiomorphologies, 2006

George Poonkhin Khut with Lizzie Muller & Greg Turner



scale:

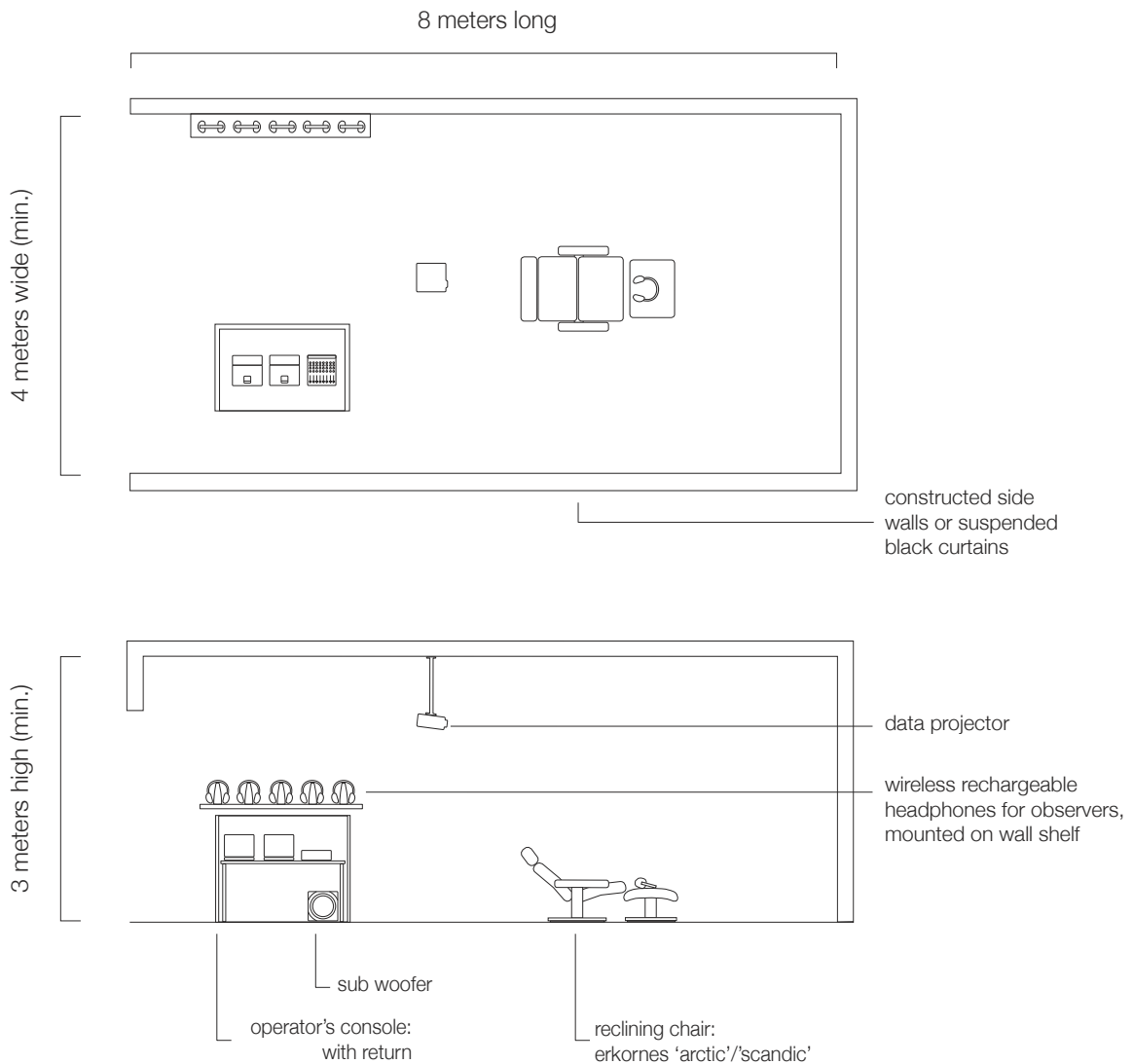


Data projector: minimum 2000 lumens.
 Minimum suggested projector throw:
 5 meters. Adjust projector throw for
 maximum fit of image to top and bottom of
 wall /projection surface

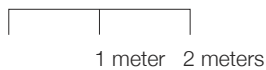
Sound system configuration:
 bank of six rechargeable wireless
 headphones with sub woofer

Installation concept and design by
 George Poonkhin Khut
 as at December 2005

Contact: george@georgekhut.com



scale:



Installation concept and design by
George Poonkhin Khut
as at December 2005

Contact: george@georgekhut.com

Data projector: minimum 2000 lumens.
Minimum suggested projector throw: 5 meters.

Adjust projector throw for maximum fit of image to top, bottom and sides of installation space. Side walls or curtains may need to be installed to frame the projection.

Sound system configuration:
bank of wireless headphones
with sub woofer

Venue requirements

A quiet location, away from other audio artworks and large crowds of people. The work should be able to be heard without being loud.

Minimum room dimensions: 3 x 4 x 8 meters,

Light insulated darkened space for video projection.

Hardware requirements

1 x Macintosh G4/G5 computer, 1 GHz, 1 G RAM: data analysis and sonification*

1 x Macintosh G4/G5 computer, 1 GHz, 1 G RAM: real-time visualisation

2 x 17" LCD Monitors

1 x Network router (minimum of two ports)*

1 x Vernier Wireless Heart Rate (hand held) sensor and serial-port receiver*

1 x Breath movement sensor and CV-MIDI converter*

1 x Data projector (minimum 2000 lumens for image approximately 3 x 4 meters)

Furnishings

1 x Erkoknes 'Stressless' reclining chair ('Arctic' or 'Scandic' design)
or equivalent comfortable reclining chair

1 x Operator's Desk (approx. 900mm x 1500 mm) for two computers, sensor equipment and amplification hardware

1 x Desk return (approx. 1200 mm high x 1500 mm wide) to conceal computers, sensor hardware, and signal cabling

Audio hardware, quadraphonic loudspeaker option

1 x Logitech X-530 5.1 speaker system (or equivalent)

1 x USB/Firewire sound card* (minimum 6 channels out)

Audio hardware, headphones option

1 x Sennheiser RS 130 Wireless stereo headphone set with transmitter

5 x Sennheiser wireless stereo headphones capable of receiving signal from above transmitter

1 x Subwoofer 100 watts, with crossover hardware

* indicates equipment that can be provided by the artist

Exhibition logistics

Visitors interact with the work one at a time.

Each session lasts between 7 and 30 minutes, as determined by each participant. 15 to 20 minutes is usually enough for most participants.

A booking system is recommended. Prospective participants book a time with the venue reception staff, based on available time slots. Alternatively a first come-first served system can be used: no bookings at all.

It can take up to 3 minutes to get started: attach breath sensor; fit breath sensor so that it is measuring breath movements properly; and wait for wireless heart sensor to identify pulse signal.

Other visitors are free to observe.

The exhibition can be run for four hours at a time, with a 45-minute break in between for the operator.

Staffing requirements

1 x Operator to assist participants into the work, supervising attachment of breath movement sensor, explain how the interface works, how they can influence its/their behaviour, and start/stop interactions according to schedule.

1 x Receptionist to greet visitors, introduce the work and how they can participate in it, and coordinate bookings and interaction schedules.

Cardiomorphologies, 2006

George Poonkhin Khut with Lizzie Muller & Greg Turner

Background information: physiological basis

Cardiomorphologies explores our ability to sense and influence aspects of our mind-body state through a safe and relaxing process of biofeedback mediated interaction.

Some aspects of our heart rate and breathing can be influenced by our thoughts, emotions and mental processes. Cardiomorphologies analyses and transforms these changes in ways that enable you to sense and eventually influence these changes.

When we breathe in, our heart rate tends to increase in speed, and when we breathe out, our heart rate tends to slow down. When your breath rate slows down to around six breaths per minute and you are feeling relaxed, these breath related changes in your heart can become very pronounced. Cardiologists call this phenomena of breath related changes in heart rate 'respiratory sinus arrhythmia'.

When breathing and heart rate variations become synchronized like this, a resonant effect can be observed. This resonance between slow breathing movements and heart rate changes can happen naturally during activities like breath-meditation and also when we experience strong feelings of love, appreciation or 'oneness with the world'.

Changes in breathing and heart rate patterns can reflect changes in your autonomic nervous system response: from the stressfull 'fight-flight' reflex indicated by decreased variations in heart rate, to the calming 'rest-digest' reflex. These nervous system responses are usually influenced by our conscious or subconscious perception our surrounding environment: *'is this an appropriate situation for relaxing my gaurd?'; 'how ready do I need to be for a sudden mobilisation?'; 'is this situation safe or dangerous?'*.

These changes in nervous system ballance are generally unconscious. Cardiomorphologies has been designed to help audiences explore a more conscious participation in these response patterns, through the exploration of contrasting emotional, mental and respiratory behaviours.

Very low heart rate oscilations (around one cycle every two minutes) tend to be associated with increased fight-flight nervous activity. Slight faster oscilations in heart rate (around six cylcles per minute) reveal the influence of slow breathing patterns, and have been corelated to the rest-digest response.

Because these oscilations take place at such slow frequencies, it takes at least five minutes before they can be measured and analysed. Rather than showing immediate changes in response to certain emotions or mental activities, Cardiomorphologies reveals gradual shifts taking place within a three to five minute timeframe.

These mentally or emotionally mediated changes in nervous system ballance, breathing and heart rate represent very simple forms of psychosomatic responsiveness. Psychosomatic responsiveness varies from one person to another, and some participants in Cardiomorphologies will show a greater amount of variation than others. In addition to exploring psychosomatic responses, Cardiomorphologies invites us to consider possibility of 'somato-pshychic' responses: bodily orientations that influence or entrain certain mental and emotional orientations.

What happens during a typical interaction?

On entering the gallery, visitors are greeted by the receptionist/gallery attendant, who tells them about the work and how they can participate in it. The receptionist leads the participant into the space, and they are greeted by the operator/artist.

The operator explains how the two sensors will be recording their heart and breathing movements, and assists the participant with putting on the breath sensor: a belt shaped device that is worn around their upper or lower abdomen.

The participant then sits down in the reclining chair. The breath sensor will usually need additional adjustment to fit to the shape of their body in the reclining position. Participants observes the artwork responding to their breathing during this fitting process, and learns how the work responds to different types of breathing.

The participant then takes hold of two small cylindrical heart rate sensors, and after 30 seconds they will start to hear their pulse transformed into a deep sub base throb.

After five minutes participants can choose to enter into the first of two experiments into psychologically mediated changes in heart rate patterning. Participants are invited to invoke some form of intensely felt positive emotion/ sensation (i.e. resting on a beach, being with loved ones etc.) for a period of five minutes; examine the state of the work; and then in their own time, invoke a contrasting mentally demanding process or scenario (i.e. math calculations, detailed technical procedure, or difficult social interaction) for another 5 minutes; examine to what extent this activity alters their heart rate and breathing patterns as revealed through the art work.

Participants can conclude their interaction at anytime by placing the heart sensors down onto the footstool before them. If they have not concluded their interaction after 25 minutes, the operator will manually fade out the video and sound feedback to signal the conclusion of the work.

Safety information

Cardiomorphologies invites participants to explore slower rates of breathing that tend to entrain a state of quiet relaxation. Heart rate variability biofeedback is entirely safe. Nothing is being done to the participant: they are at all times directing their own experience through their own processes of observation and interaction.

Participants are advised both verbally and in writing to refrain from excessively fast or deep breathing that could result in hyperventilation, and to avoid sudden changes in posture that could lead to potential dizziness after the interaction.

For further information about saftey and risk of harm, please refer to the "Cardiomorphologies Participant Release Form".

Cardiomorphologies, 2006

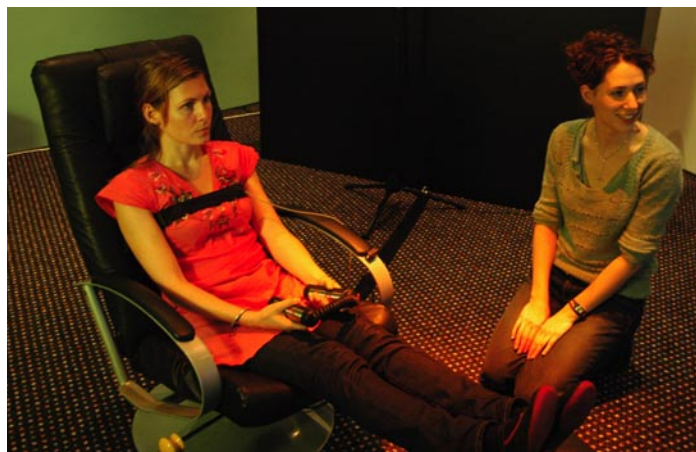
George Poonkhin Khut with Lizzie Muller & Greg Turner



Attaching the breath sensor belt around the participants.
The sensor measures breath related changes at the point of contact.
Most participants can obtain good readings with the sensor attached just above or below their breast area.



Participant holding the wireless hand-held heart rate sensors. Participant's conclude their interaction, by placing the heart rate sensors down on the foot stool before them, which causes the sound and video to fade out.



Documentation of *Cardiomorphologies 2*, as exhibited at Powerhouse Museum Sydney, Beta_Space gallery, 14-21 September 2005: Lizzie Muller assisting participant with fitting of sensors and explaining basic correlations. All photographs by Greg Turner.

Cardiomorphologies, 2006

George Poonkhin Khut with Lizzie Muller & Greg Turner

Cardiomorphologies Release Form

Cardiomorphologies is an artwork (the "Work"), created by George Khut (the "Artist") that uses biofeedback technologies to enable participants to interact with aspects of their heart-rate-variability and breathing patterns.

To interact with the Work you will be fitted with a stretch sensor around your abdomen or ribs and given a wireless heart rate monitor to hold in both hands. These sensors will feed information about your breath and heart rate to the computer which will control patterns projected on the screen in front of you and sounds surrounding you.

During your interaction the artist may suggest you modify your breathing in different ways, or experiment with how certain mental imagery, thoughts or memories affect the patterns and sounds. These experiments are completely voluntary; you do not have to do them.

Interactions last for approximately 20 minutes, you may ask for it to last longer if you wish and it will continue at the artist's discretion. **If at any point you wish to stop the experience** just place the heart rate sensors on the stool in front of you and the work will start to fade out, indicating to the operator that you have concluded your interaction and are ready to leave the work.

Please avoid over breathing or breathing too fast. The most common cause of discomfort during breath based interactions is from hyperventilation, which can lead to feelings of dizziness, light-headedness and tingling sensations. If you feel any of these sensations you should stop or pause your interaction with the work.

*You should also avoid any sudden changes in posture during and immediately after your interaction: sudden changes like standing up too quickly can lead to rapid change in blood pressure, and in some rare cases result in dizziness, nausea or even fainting.

Name:

Phone: Email:

Address:

Note to parents: The artist advises that the Work may not be suitable for children under 10. Children under 18 will not be admitted without consent from a parent or guardian, who must remain present throughout the interaction.

Your personal details will be used solely for the purposes of identifying participants in Cardiomorphologies

Acceptance of Risks, Release and Medical Declaration

I hereby recognise that experiencing the Work could, in some rare circumstances, result in physical or mental injury and that I should seek medical advice if I am uncertain of the risk to my personal health. I declare that I have read and understood the material contained in this form, I am aware that I am can seek further information from the artist George Khut, and that I wish to experience the Work at my own risk.

In consideration of my being accepted to experience the Work, I release the Artist, << insert name of host venue here>> and all other organizers and sponsors, their employees and agents, from any claim for damages or injury suffered by me as a result of my experiencing the Work.

I certify that I am in proper physical condition to experience the Work and that I am over the age of 18/have obtained the informed consent of my parent or guardian. I understand that there is a risk of injury or discomfort to me from experiencing the Work if I have any of the following conditions:

- heart problems,
- severe psychiatric disorders,
- proneness to convulsions or fainting,
- epilepsy (even if controlled by medication)
- conditions that require the use of medications including insulin, oral hypoglycaemic, thyroid replacement, anticonvulsants and antihypertensive medications*,
- any other medical condition which could be aggravated by experiencing the Work.

Signed: (Participant's signature): Date:

Parent or guardian's signature (if participant is over the age of 10 but under the age of 18):

Signature of Parent/guardian: Date:

Cardiomorphologies, 2006

George Poonkhin Khut with Lizzie Muller & Greg Turner