PROCEEDINGS OF THE FIFTH INTERNATIONAL SYMPOSIUM ON ARTIFICIAL LIFE AND ROBOTICS

(AROB 5th '00)

Vol. 1

Jan. 26-Jan. 28, 2000
Compal Hall, Oita, JAPAN

Editors : Masanori Sugisaka and Hiroshi Tanaka
ISBN4-9900462-0-X

Proc. of The Fifth Int. Symp. on Artificial Life and Robotics (AROB 5th'00),
Oita, Japan, 26-28, January, 2000,

Healing technology with Artficial Life
-Unconscious Flow-

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Abstract

In face-to-face communication, the occasional need for intentional lies is something with which everyone can identify. For example, when we get mad, circumstances may force us to put on a big smile instead of expressing our anger; when we feel miserable, good manners may dictate that we greet others warmly. In short, to abide by social norms, we consciously lie. On the other hand, if we consider the signs that our bodies express as communication (body language), we can say that the body does not lie even while the mind does. Considering this phenomenon, we propose a means of "touching the heart" in a somewhat Japanese way by measuring the heartbeat of the "honest" body and using other technologies to reveal a new code of non-verbal communication from a hidden dimension in society. We call this "techno-healing art."
Keywords: *A-life art, interactive art, emotion model, healing technology*

1. Introduction

The author believes that interactive art is one type of components that provides sympathy with communications. Interactive art can be thought of as one type of emotion and sympathy interface. It is familiar to us, and it forms agents or characters that can handle sensitive communications. In addition, they work on our mental states and emotional expressions, and on our character and intelligence, means that a person can also self-create his or her own personality. On the other hand, emotion recognition technology recognize only surface emotion of people [1][2][3]. I am interested in how to recognize unconsciousness feeling using computer-based interaction. Art is familiar to describe human unconscious emotion. I tried to realize in interactive art with technologies and techniques of art.

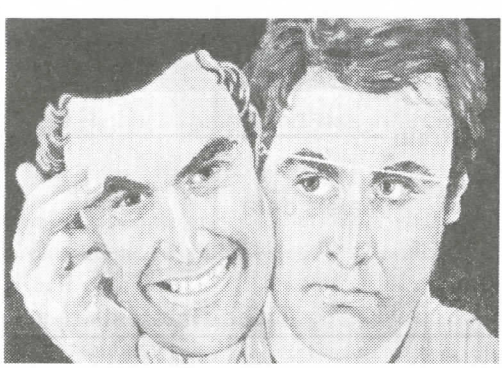


Fig.1 Mask of face

2. Concept of Unconscious Flow

Two computer-generated mermaids function as individual agents for two viewers. Each mermaid agent moves in sync with the heart rate detected by an electrode attached to the collarbone of its viewer. Then, using a synchronization interaction model that calculates the mutual heart rate on a personal computer, the two mermaids express hidden non-verbal communication. The data of relax-strain calculated from the heart rate and the interest calculated from the variation in the heart rate are mapped on the model. The synchronization interaction model reveals the communication codes in the hidden dimension that do not appear in our superficial communication. Then, using a camera to pick up hand gestures and a personal computer to analyze the images, the synchronization interaction model is applied to determine the mermaid's behavior. For a high degree of synchronism, the agents mimic the hand gestures of their subjects, but for a low degree of synchronism, the agents run away. As for background sound, the heart sound of the subjects are picked up by an heart rate sensor and processed for output on a personal computer for bio feed back. This work collaborate with Sony-Kihara Research Center, Inc.

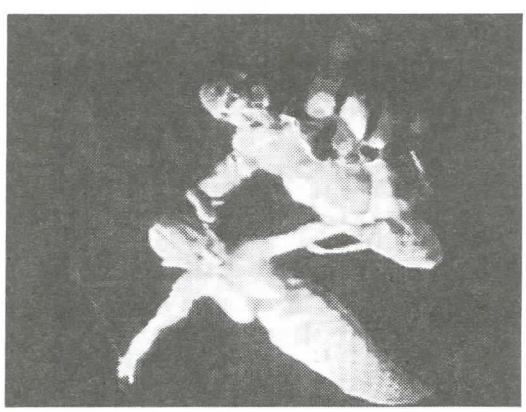


Fig.2 In the bucket of [Unconscious Flow]

3.System

For installation, a space with four meters wide, four meters deep and three meters high is required. A dark and quiet space is preferable. Interactive actions are displayed on one main screen and two Japanese "shoji" screens. A

Japanese "hinoki" wooden bucket with a diameter of one meter that is filled with water is placed in the center of the installation,. Two persons, fitted with a stethoscope, experience non-verbal communication by touching their CG embodiments in the bucket. The synchronity based on the heart rate from the electrodes of the electrocardiograph is calculated by the PC, and the PC generates an arbitrary feeling in a CG form. The hand movements of the two persons are caught by an installed camera and an image analysis for the data is performed. In accordance with the synchronity interaction model, the CG embodiment either follows the movement of the hand of the partner with high synchronity or goes away from the hand of the partner with low synchronity. When one touches the CG embodiment of the partner, a vibrator gives him a simulated feeling of touch. The hrartrate sensor measures the timing of the heart, which is processed by the PC and outputted.

We were showing SIGGRAPH'99 Art Show.

Many nationality people intearct with [Unconscious Flow].

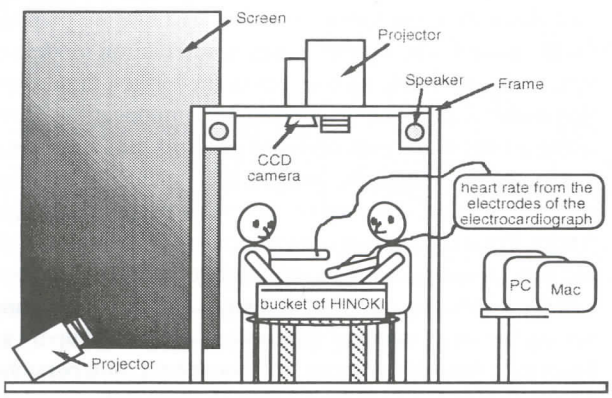


Fig.3-1 System of [Unconsious Flow]

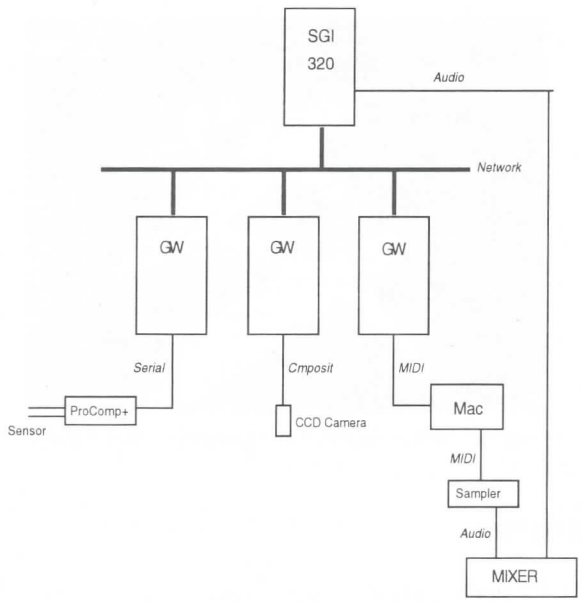


Fig.3-2 Hardware configuration

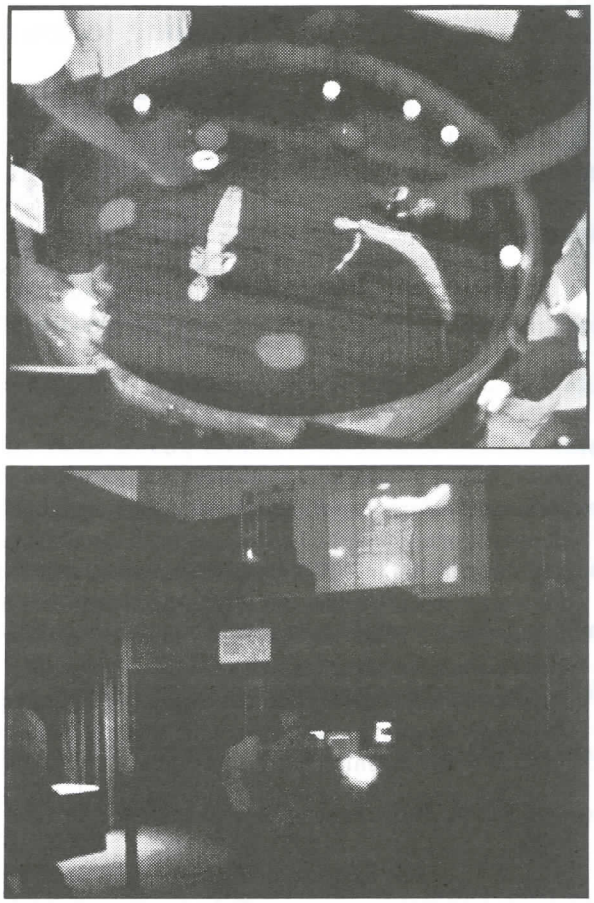


Fig.3-3 [Unconsious Flow] showing in SIGGRAPH'99

4. Synchronization interaction model

The data of relax-strain calculated from the heart rate and the interest calculated from the variation of the heart rate are mapped on the model. The synchronity interaction model reveals the communication codes in the hidden dimension that do not appear in our superficial communication.(Fig.4)

For example, (1) When both people are in the domain where they are highly relaxed and interested, they are considered synchronized. An animation is generated in which, for example, their CG-reactive embodiments join hands in brotherhood or enjoy friendly actions.(Fig.5)

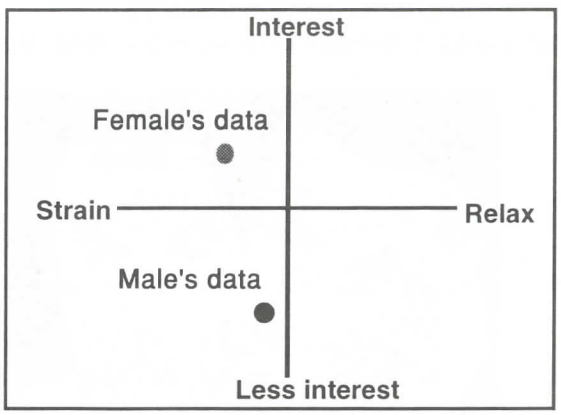
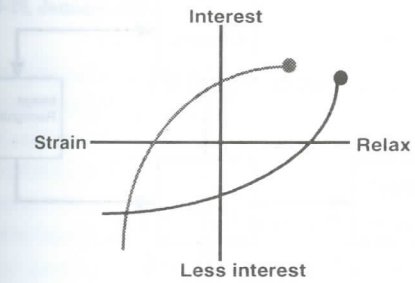


Fig. 4 Synchronity interaction model



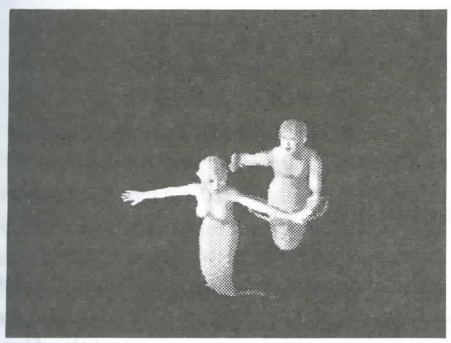
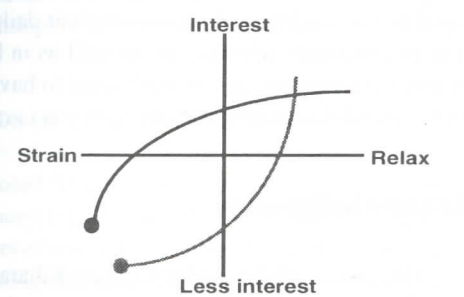


Fig. 5 Highly relaxed and Interested

(2) When both people are in a situation where they are highly strained and less interested, unfriendly communication is generated. An animation is generated in which, for example, their CG embodiments quarrel with each other.(Fig.6)



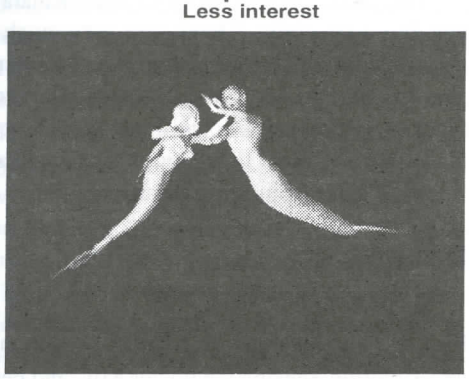
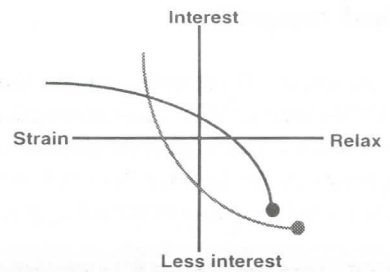


Fig.6 Highly strained and less interested

(3) When both people are in the domain where they are highly relaxed and less interested, they are considered, "going their own ways". An animation is generated in which, for example, their CG embodiments do not interfere with each other.(Fig.7)



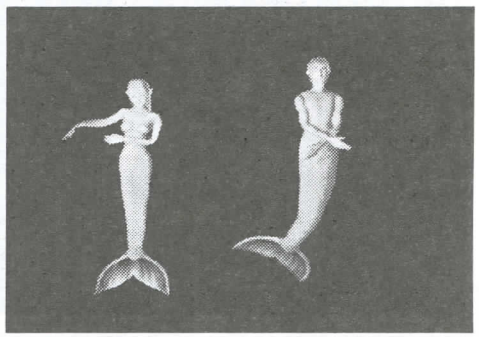
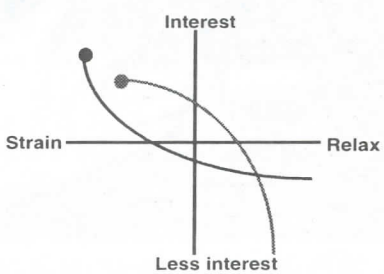


Fig.7 Highly relaxed and less interested

(4)when two persons are in a situation where they are highly strained and highly interested, they are assumed to have stress and feelings of shyness. An animation is generated in which, for example, their CG-reactive embodiments behave shyly. In this way, (Fig.8)



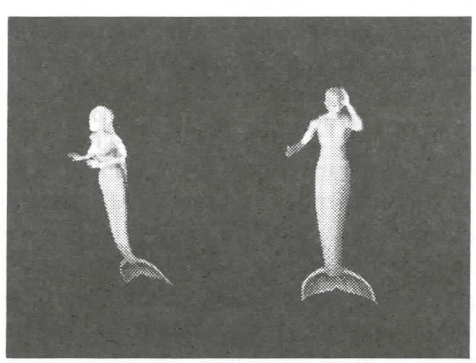


Fig.8 Highly strained and Highly interested

new codes of non-verbal communication that can't be seen in face-to-face communication are found through the CG of the embodiments

5. Hand recognition

A person's hand with a marker is recognized by using CCD camera. CCD camera recognizes the position of two markers. The related program (Image Recognition) prosecces the distance between two markers and whether a hand touches a mermaid or not.

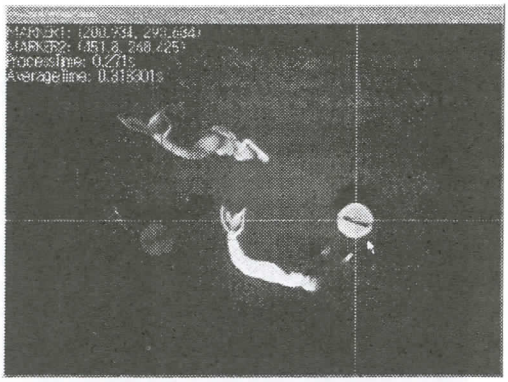


Fig.9 Image processing by hand recognition

6. Heart rate sensor

A person's heart rate is measured by putting the sensor on his finger. The heart rate is sent to a PC connected the heart rate sensor(ProComp+) via RS232C and is mapped on the synchronity model depending on the heart rate.

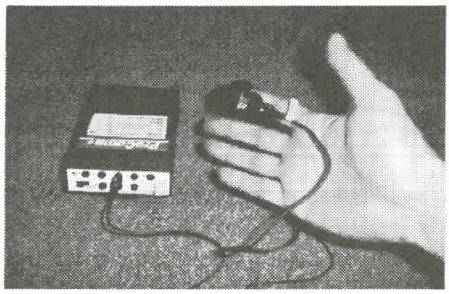


Fig.10 People put on heart reate sensor

7. Software configuration

Heart rate Analyzer is used to analyze the input data and to send the data to Event Control as event data. Event Control sends heart rate as MIDI commands to MAX/MSP program on Macintosh and some commands to Computer Graphics Generator if some Computer Graphics needs to be changed depending on the heart rete. Computer Graphics Generator creates Computer Graphics based on these commands and outputs the Computer Graphics. MAX/MSP program processes the sound data and the heart rate sound as required and then outputs it. Image Recognition analyzes the image data fed from a CCD camera and the relational information of the hand, and the Computer Graphics displayed is sent to Event Control and Computer Graphics Generator. Event Control sends some commands to Computer Graphics Generator if some Computer Graphics needs to be changed depending on the data.

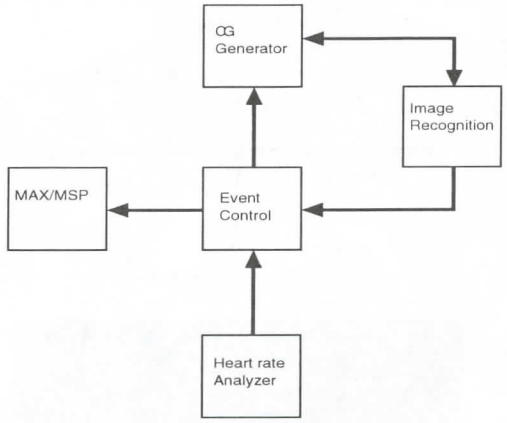


Fig.11 Software configuration

8. Conclusion

This work was exhibited at SIGGRAPH'99 that was held in Los Angeles. So many people visited the exhibition site and enjoyed the interaction of this Unconscious Flow. In the west coast the idea of healing and meditation is familiar. That is the reason why this work has been accepted by so many people. So far, this work uses biofeedback function based on heart rate of oneself. The other areas related to this work is sound hearing and hearing psychology. Future study will collaborate with these areas.

Healing technology with A-life will become very important in the future for human to human and even human to computer interactions. In the present day, people are exposed to various kinds of stresses in their daily life. In human to computer interactions as well as in human to computer communications, people want to have relaxed and less stressful communications.

9. Acknowledgments

This work collaborated with Sony-Kihara Research Center, Inc. Especially, Thank you very much for manager Mr. Ueda and senior researcher Mr. Asukai, Mr. Sakamoto, Mr.Oto,Mr. Nozaki, Mr.Serita and general manager Mr. Komatsu.Also, ambient heart beat music by Mr.Nagahara and Real time Computer Graphics technology by Mr. Ozaki from Sony creative center.

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