Exploring the Boundaries between Perception and Action in an Interactive System

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The relationship which interactive art establishes between author, work, and audience is unprecedented in the context of the hybridisation of man and his artefacts. As these environments draw closer to the autonomy of organisms, combining scientific and artistic concepts, they begin to build an intimate engagement with the audience. We are proposing an interactive installation that implements the concept derived from the theory of autopoiesis. In the setting of this interactive environment, we are conducting user studies to explore links between whole body movements, perception, and social interaction.

Introduction

The digital revolution has produced a new genre in art. Interactive art embraces the relationships of the body and environment through technology. Body, environment and technology can be considered meta-components through which interactive relationships are formed. Digital technology is now firmly embedded in society, and has created conditions that facilitate a cohesive matrix between human – human and human and environment. This development is reflected in the engagement of meta- components in interactive art which has as result broadened in definition and complexity.

The overall trend in this genre of art has taken on a communication focus that is increasingly body-centric evolving along the cognitive paradigm of a constructed reality [Stewart, 1996]. Early engagement with interactive art entailed simple push-button movements that limited the body to a machine-like input device that navigated a screen display. From here the logical evolution preceded with gestural[1] input providing "mirror" interactivity [Lavaud, 2004], the dynamic of imitation and immediate feedback loops between human and image. More sophisticated interactive artworks are now beginning to evolve, which reflect human body-consciousness through active, immersive participation using complex, full-body motion.[2] This body-centric perspective equally translates to the ubiquitously deployed technology. Initial simple database design stands next to intelligent, emergent, and adaptive systems which mimic the autonomy of human beings. According to artists Lavaud, Bret, and Couchot these systems are paths of investigation, they liberate the artist from being the author in the conventional sense since the outcome is ongoing and open-ended. Couchot has located the hybridisation of these works, the crossing between heterogeneous, technical, semiotic, and aesthetic elements, in the space between the work and the interactor, connecting human and machine through intimacy. Interactive environments that synthesize theoretical knowledge from cognitive science and artificial intelligence establish a relationship between art and science that is practical and operational [Couchot, 2005]. They can therefore offer context-related insight when studying new theoretical grounds.

Poster Summary

The research featured in this poster is a participatory, interactive installation exploring social coordination and perception. We are modelling the interaction on Maturana & Varela's

[1] For example: Monika Fleischmann and Wolfgang Strauss "Liquid Views"
[2] Examples of such works are: "passus: A Choreographic System for Kinaesthetic Responsivity" by Susan Kozel and Gretchen Schiller http://www.meshperformance.org/ and "Intimate Transactions" by Keith Armstrong, Lisa O'Neill, and Guy Webster. http://www.intimatetransactions.com/

[Maturana et al., 1980] definition of the communication of autopoietic organisms with the aim to investigate the embodied mind within the boundaries of a social network. Autopoiesis looks at communication as circular organization in contrast to the traditional information-exchange metaphor analogous to a computer. Our system relies on a tight coupling between whole body movements, perception, and social interaction. Through a spatial arrangement in the environment, participants stand in a circular, dedicated area facing inwards while interacting with a visual projection. The interaction builds on the participants' reciprocal coordination of whole-body, swaying movements that contribute as input to create a visual stimulus. The visual stimulus is an image of a waveform generated by the swaying movements of the participants which can move from a turbulent to a stable state depending on the collective, coordinated movements. A continuous visual feedback to the participants' swaying movements provides a closed loop. The image is projected top-down into the centre of the ring of participants. A network is formed between the participants, following a circular causality between the individual participants and the group. For example, a participant might initiate a coupling, such as eye contact, which encourages a swaying action in the other interactor who in turn alters the state of the stimulus and hence affects what is perceived by the entire group. The state of the stimulus is being generated and re-generated by networked, social interaction between the members of the group.

Through a series of user studies we probe this interactive environment for answers relating to the participants' coordination and communication with the system. Will participants synchronize their movements to achieve a stable state in the visual stimulus? Under what circumstances will they synchronize and coordinate their movements? How will the participants learn to communicate? Will they know and be able to communicate in any detail how they achieve changes in the display? If the participants stabilize the state of the visual stimulus what happens if that state is disturbed by the system?

We aim to find a match between two views (artistic and formal) on several central questions:

- Under what circumstances will participants learn to synchronize the formation of a stable visual stimulus?
- What are the important variables in the time evolution of the system?
- Our exploratory aim is to understand under what conditions the behaviour of the system, including the human participants, will show interesting regularities over time (attractors) in terms of interpersonal communication?

We have currently deployed a prototype that accommodates two participants. While gradually building up to five participants, the initial smaller scale set-up will provide insights through user studies determining the characteristics of a natural swaying movement and the algorithmic adjustments that have to be made to accommodate the visual display. Furthermore, we will study what entails a convincing correlation between the visual depictions of a moving waveform when translated from the participant's movement. This poster will report on the results obtained through video footage, logging and charting of swaying movements, and interviews of the participants.

References:

Stewart, J., (1996). *Cognition = life: Implications for higher-level cognition.* Behavioural Processes **35**: p. 311-326, Elsevier

Lavaud, S., *Les image/systèmes: des alter egos autonomes.* 2002- 2004, L'université Paris8. http://hypermedia.univ-paris8.fr/seminaires/semaction/seminaires/txt01-02/journees0602/sophie.htm

Bret, M., http://www.demiaux.com/a&t/bret.htm. access date: june 2006.

Couchot, E. (2005). *Media Art: Hybridization and Autonomy.* in *First International Conference on the Media Arts, Sciences and Technologies* Banff, Canada: Banff New Media Institute.

Maturana, H.R. and F.J. Varela, (1980). *Autopoiesis and Cognition: The Realization of the Living*. Reidel, Dordrecht.