

Chapter 7 Future Directions

The works documented in this exegesis have laid the foundations for an approach to the development of biofeedback interactions as vehicles for embodied enquiry and aesthetic appreciation. Biofeedback interactions enable us to re-imagine our subjectivity as a deeply embodied and instrumental phenomena.

Throughout this exegesis much attention has been paid to the way in which particular interfaces support specific qualities of engagement, and considerable energy has been invested in the exploration of breath-sensing technologies. The overwhelming tendency of these sensors to draw participants into exaggerated and forceful breathing patterns has provided an important catalyst for my re-conceptualisation of biofeedback as a vehicle for exploring subjectivity and the concept of *non-action* in particular. By contrast, heart rate variability spectrum analysis has emerged as a powerful tool for the creation of highly individualised and richly detailed interactive artworks. The potential of this modality for the creation of subjectively responsive artworks is rich with possibilities for future development.

Under suitable conditions, HRV spectrum analysis can provide compelling demonstrations of the close links between mental activity, emotion and autonomically mediated variations in heart rate. By differentiating contrasting forms of subjective engagement according to their associated HRV spectral profiles, the participant's subjectivity is represented as a fundamentally active process of orientation. The quality of engagement is of critical importance here: HRV spectral analysis can enable participants to differentiate contrasting forms of mental effort and engagement. The artwork's appearance can thus be made contingent on the quality of the *participant's* engagement. *Non-action*, (defined as a decrease in mental effort and non-judgemental engagement) can thus be developed as a form of gestural interaction, and has emerged from the process of exploration documented in this exegesis as key priority in the development of future works exploring biofeedback interaction.

7.1 Beyond Research and Development

Having established a working understanding of principals of HRV Spectrum analysis and biofeedback design through the four works documented in this exegesis, it is clear that the next stage of the work's development will need to focus on the implementation of a more dynamic and individualized visualisation and sonification system, and a reconsideration of the project's overall communications strategy. Based on the experience-centred approaches explored in this exegesis, each aspect of the work's presentation will need to be reconsidered in terms of the cues they provide to the visiting audience. By re-examining the experience as a whole, in terms of the different stages and qualities of engagement involved, certain aspects of the work that have hitherto proved too complicated or confusing (i.e. 'what is heart rate variability?' and 'what does this tell me about the state of my body?') can be addressed in ways that preserve the integrity of the main interaction while providing interested audiences with pathways for more theoretical explorations of the psychophysiological processes at the heart of the work. Video recordings of each interaction with the work could also be provided to participants as a memento of their experience, extending the reach of the work into the domain of their ongoing life experiences.

Whilst not explored in this exegesis, time-series representations and comparisons represent another area of development rich in possibilities; enabling participants to compare in retrospect changes in physiology taking place within individual interactions and across multiple users. Other forms of long-term statistical analysis and representation could be developed to reflect the overall flavour of interactions recorded by the work over several days, or as an accumulation of individually deposited layers of information; creating a symbolic record of the exhibition as an accumulation of private reveries, ruminations and experiments.

The use of ethnographic methods for documenting and representing audience experience, and the possibilities for the development of these processes as performative elements of interest in their own right has already been noted. Considered within the context of the relational and dialogical art practices documented in Chapter 3.1 the possibilities presented by such methods deserve further exploration, and will likely provide the basis for new research beyond my current work with biofeedback and body-mind representation.

7.2 Consolidating Methods and Tools

One critical element for future work in this area concerns how the conditions of production influence the quality of the completed product. In Chapter 5.4.2.2, the process of play was identified as a crucial element in the development of experientially satisfying art works. The means by which such a work is created can have a determining

influence on the quality of experience provided by the completed artwork. Greg Turner's data manipulation 'toys' highlight the importance of play in the creation of aesthetically engaging data-mappings schemes. Through the process of extended play, artists establish a sense of familiarity and rapport with the dynamics of the data to be mapped and the responsiveness of the various visualisation and sonification systems. This rapport constitutes a form of embodiment through which the artist articulates the various intensities and channels of flow that characterise the form and quality of the completed design. Future work with experientially focussed data-mapping systems, such as those documented in Chapter 5 would benefit from closer examination of the role of technology and compositional method in support of the creative process. An interactive model of the data to be mapped (i.e. a realistic and fully adjustable simulation of autonomically mediated heart rate variations) would greatly assist with the testing and evaluation of new sonification and visualisation schemes, and could be programmed to emulate a wide range of real world behaviours. Such a model could also serve as a starting point for the development of interactive interpretive displays that could be used to explain the principals of HRV spectrum analysis to interested audience members.

7.3 Wider Applications

Interactive art experiences, as explored by the works documented in Chapter 3 and Chapter 5, provide a compelling medium for critical explorations of self as a complex phenomenon embodied within multiple dimensions of influence i.e. cognitive, physiological, ecological and sociological.

This exegesis has concentrated primarily on an exploration of our *physiological* embodiment, but throughout the development of these works I have often wondered to what extent the principals of interaction and feedback explored in this exegesis might be extended to broader explorations of our social and/or ecological situation. Recent developments in areas such as community media (Garcia, 2003), global positioning systems (Adams et al., 2006) and telecommunication networks (Tuters and Varnelis, 2006, Mobilegaze, 2005) are supporting a growing body of artworks, community development and various media interventions engaging with this very issue, inviting us to imagine and reflect critically on the wider implications of our actions.

Central to many of these approaches is a concern for the development of the "artwork as public research laboratory", a phrase coined by Rokeby (1998) to describe the critical and participatory nature of his own practice-based research. This notion has been explored intensely through each of the works discussed in Chapter 5 and 6 and provides a compelling model for future research into other dimensions of embodiment and social practice.

7.3.1 Art and Health

One area of particular relevance to the artworks documented in this exegesis is the relatively recent field of ‘arts and health’ and health promotion. As a field, arts and health is far ranging and diverse in its approaches and outcomes, ranging from arts therapies and the display of curated exhibitions in hospitals, to community cultural development projects focussed on broader community health, overall wellbeing and wider sustainability concerns (Putland, 2003).

Given the proliferation of electronic sensing devices in contemporary health care, it is surprising that so little work with interaction and biofeedback has been undertaken in this field, and this gap in existing arts-and-health practice can only strengthen the case for potential residencies, exhibitions and associated research and development work. Presented within the context of health promotion and education programs in hospitals, museums and educational institutions, works like *Cardiomorphologies* have real potential to introduce audiences to a more considered and inspirational appreciation of personal wellbeing, not simply as the absence of illness and pain, but as a source of pleasure and a vehicle for deeper self understanding and personal growth.