

Contents

1	Introduction	1
1.1	Background	5
1.2	Theoretical foundations	7
1.3	Research design	10
1.4	Contributions of the research	11
1.4.1	Design methodology of Moving and Making Strange . .	12
1.4.2	Laban movement analysis and Labanotation as a design tool	13
1.4.3	Suchman’s analytic framework adapted as a design tool	14
1.4.4	Extension of existing design tools to explicitly represent moving bodies	14
1.4.5	Patterns of watching	15
1.4.6	New methods for generating, enacting and experiencing movement	15
1.5	Thesis structure	15
2	Interaction Design	17
2.1	Phenomenologically-inspired approaches to interaction design .	18
2.2	Ethnographically-inspired approaches to interaction design . .	20
2.3	Interaction analysis and Suchman’s analytic framework	23
2.4	Design representations and ways of seeing	26
2.4.1	Visual representations and visual communication practices	28
2.4.2	Conceptual design frameworks	30
2.4.3	Personas and scenarios	33
2.4.4	Summary—Design representations and ways of seeing .	35
2.5	Methods and techniques for working with the moving body . .	36
2.5.1	Bodily understanding	36
2.5.2	The moving body as a design material and design sensibility	38
2.5.3	Enactment and physical role-playing	41

2.5.4	Summary—Methods and techniques for working with the moving body	46
2.6	Summary—Interaction Design	47
3	The Moving Body	49
3.1	The central role of movement	50
3.2	Understandings of the moving body	52
3.2.1	Movement as anatomical, mechanical function	53
3.2.2	Movement as expression and transformation	54
3.2.3	Movement as perception	55
3.2.4	Movement as felt, kinaesthetic experience	57
3.2.5	Movement as a communicative act	58
3.2.6	Summary—Understandings of the moving body	62
3.3	Analysing and describing movement	62
3.3.1	People analysing and describing movement	62
3.3.2	Movement notations	68
3.3.3	Algorithmic analysis of movement	73
3.3.4	Summary—Analysing and describing movement	75
3.4	Laban movement analysis and Labanotation	76
3.4.1	Laban movement analysis	77
3.4.2	Labanotation	80
3.4.3	Applications in computing fields	84
3.5	Summary—The Moving Body	85
4	Research Methodology	87
4.1	Issues of methodological validity	90
4.2	Project I—Eyetoys	92
4.2.1	Research methods	92
4.3	Project II—Bystander	94
4.3.1	Research methods	95
4.4	Project III—Falling into Dance	96
4.4.1	Research methods	99
4.5	Summary—Research Methodology	100
5	Project I. Eyetoys	101
5.1	Introduction to Eyetoys	102
5.2	Experimental setup	105
5.3	Initial data analysis	105
5.4	Movement analysis and Labanotation	107
5.4.1	Examples of Labanotating	109
5.5	Interaction analysis—Suchman	115

5.6	A critique of Labanotation	119
5.6.1	Functional and performed movement	119
5.6.2	Simplicity and specificity	120
5.6.3	Context of movement	122
5.6.4	Reading and writing	123
5.7	Findings	124
6	Project II. Bystander	126
6.1	Overview of Bystander	127
6.2	Understanding and representing moving bodies	132
6.2.1	User studies	133
6.2.2	Movement-oriented personas and characters	135
6.2.3	Movement-oriented scenarios and scripts	137
6.2.4	Movement schemas in Labanotation	140
6.2.5	Suchman's analytic framework as a design tool	145
6.3	Enacting design representations of moving bodies	151
6.3.1	Enactment and physical immersion for design reflection- in-action	154
6.3.2	Situated understandings of notions of presence, move- ment and stillness	155
6.3.3	Movement, stillness and audience engagement	157
6.4	Exhibition—how did visitors move?	159
6.5	Findings	164
7	Project III. Falling into Dance	166
7.1	Study I—The falling body	168
7.1.1	Interviews and physical demonstrations	169
7.1.2	Analysis from the experiential perspective	172
7.1.3	Analysis from the external or machine perspective	177
7.1.4	Findings	185
7.2	Study II—Inventing and choreographing movement	186
7.2.1	The Divine and Bodily Experience	187
7.2.2	Generating and devising movement	191
7.2.3	Documenting movement	196
7.2.4	Findings	200
7.3	Findings	202
8	Reflection on Tools	204
8.1	Suchman's analytic framework as a design tool	204
8.1.1	Eyetoy	204
8.1.2	Bystander	206

8.1.3	Summary—Suchman’s analytic framework as a design tool	208
8.2	Laban movement analysis and Labanotation	209
8.2.1	Eyetoy	209
8.2.2	Bystander	210
8.2.3	Falling into Dance	210
8.2.4	Summary—Laban movement analysis and Labanotation	211
8.3	Summary—Reflection on Tools	211
9	A Design Methodology of Moving and Making Strange	213
9.1	Making strange	214
9.2	Genesis of methodology	216
9.3	What is in the methodology	217
9.3.1	Investigating movement	221
9.3.2	Inventing and choreographing movement	226
9.3.3	Observation, interrogation and analysis of moving bodies	228
9.3.4	Describing and documenting movement	232
9.3.5	Re-enacting movement	239
9.3.6	Visual analysis and representation of moving bodies . .	242
9.3.7	Exploring and mapping human-machine interaction . .	246
9.3.8	Representing machine input and interpretation of moving bodies	250
9.4	Summary—A Design Methodology of Moving and Making Strange	252
10	Conclusions and Future Work	254
10.1	Research questions revisited	255
10.1.1	Question 1: What understandings of human movement are relevant?	255
10.1.2	Question 2: How and in what ways can the experiential nature of the moving body be accessed and understood?257	
10.1.3	Question 3: How and in what ways can the moving body be described and represented?	257
10.2	Future Work and Applications	259
10.2.1	Validating the methodology in actual practice	260
10.2.2	Movement improvisation scores for enactment and evaluation	260
10.2.3	Choreographing new movements	260
10.2.4	Body-Mind Centering and Bodyweather	261
10.2.5	Extension to other kinds of movement-based interactive technologies	262

10.2.6 Applicability to phenomenologically-inspired and ethnographically-
inspired approaches to technology design 262