Weaving with code: How can Emotional Experience be designed into digital Jacquard textiles using coding?

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Weaving with code: How can Emotional Experience be designed into digital Jacquard textiles using coding?

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A thesis submitted in partial fulfilment of the requirements of the Manchester Metropolitan University for the degree of Doctor of Philosophy

Department of Design

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ABSTRACT

This thesis examines how sensory perception and digital coding can elicit Emotional Experience within Jacquard woven textiles. It presents a co-design participatory practice with eight Higher Education students for whom English was a first language. The investigation approaches the practice of weaving from the practitioner's lens alongside participants' area of expertise in designing with Emotional Experience.

The literature review examines and discusses current debates within three key areas of the investigation – Emotional Experience, digital coding within textiles, and co-design. This led to the development of a computer-led co-design experience approach as well as an Emotional Experience three-domain framework. The approach, which provides a space for co-designing woven textiles, has shaped the practice investigation into three stages; whilst the framework has been used to categorise participants' responses of sensory perception of woven textiles. A qualitative multi-method triangulation approach composed of qualitative research, design research and action research has been designed to conduct the investigation. The qualitative research approach has used two participatory research techniques, the Repertory Grid Technique and in-depth online video call interview, to capture participants' sensory perception of woven textiles and their responses to computer-based interface and digital coding. Using design reflection, the design research approach has created an iterative participatory weaving practice that informed the theory of the research via note taking, testing, and prototyping. The action research approach has validated the use of tacit knowledge as well as translated it into explicit knowledge by employing a reflective practice, an iterative process of reflection during the design phase of woven textiles and computer-based interfaces.

This investigation demonstrates the benefits of computer-led co-design experience for designing Jacquard woven textiles to elicit Emotional Experience. The contribution to knowledge comprises: (i) presenting a method to introduce digital coding as a tool to design woven textiles to elicit Emotional Experience during the pre-acquisition stage; (ii) categorising the use of code within the weaving practice; and (iii) highlighting the impact of ASCII code

when encrypting emotionally engaging text into woven textiles at the time to design with Emotional Experience. The findings of this investigation can benefit the literature on woven textiles by bringing new insights and connections between woven textiles and digital coding through practice-based research.

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TABLE OF CONTENTS

ABSTRACT ..... **v**

ACKNOWLEDGEMENTS ..... **vii**

TABLE OF CONTENTS ..... **ix**

LIST OF FIGURES ..... **xvi**

LIST OF TABLES ..... **xxvi**

GLOSSARY OF TERMS ..... **xxxiv**

1. INTRODUCTION **1**

1.1. RESEARCH GENESIS 1

1.2. EMOTIONAL EXPERIENCE DEFINITION 3

1.3. RESEARCH CONTEXT, QUESTION AND OBJECTIVES 6

1.4. RESEARCH APPROACH 10

1.4.1. PRACTICE-BASED APPROACH 11

1.4.2. DESIGNER AS RESEARCHER 12

1.4.3. PRACTICE OF WEAVING 13

1.5. THESIS STRUCTURE 16

2. LITERATURE REVIEW **18**

2.1. EMOTIONAL EXPERIENCE 19

2.1.1. EMOTIONAL EXPERIENCE IN CONSUMER BEHAVIOUR 19

2.1.2. EMOTIONAL EXPERIENCE IN DESIGN 24

2.1.3. EMOTIONAL EXPERIENCE IN TEXTILES 36

2.1.4.1. APPLIED TEXTILES 37

2.1.4.2. TEXTILES AS MATERIAL 39

2.1.4. EMOTIONAL EXPERIENCE THREE-DOMAIN FRAMEWORK 45

2.1.5. SUMMARY 46

2.2. DIGITAL CODING & TEXTILES 47

2.2.1. FROM THE JACQUARD LOOM TO THE EARLY COMPUTER 47

2.2.2. FROM THE EARLY COMPUTER TO THE DIGITAL JACQUARD LOOM 51

2.2.3. JACQUARD WEAVE AND DIGITAL CODE LANGUAGES 53

2.2.4. DIGITAL CODING WITHIN TEXTILE RESEARCH 58

2.2.4.1. THE AESTHETICS OF CODE 58

2.2.4.2. THE MAKING OF CODE 62

2.2.4.3. THE HIDDEN SIDE OF CODE 64

2.2.5. DIGITAL CODING WITHIN TEXTILE PRACTICE 67

2.2.6. SUMMARY 76

2.3. CO-DESIGN PROCESS 77

2.3.1. PARTICIPATORY DESIGN 77

2.3.2. DIFFERENCES AND SIMILARITIES BETWEEN PARTICIPATORY DESIGN, CO-PRODUCTION, CO-CREATION & CO-DESIGN 81

2.3.3. CO-DESIGN 85

2.3.4. COMPUTER-LED CO-DESIGN EXPERIENCE 87

2.3.5. MASS-CUSTOMISATION 89

2.3.6. CUSTOMER CO-DESIGNER 93

2.3.7. PERCEIVED VALUE 96

2.3.8. SUMMARY 100

2.4. CONCLUSION 101

3. METHODOLOGY 102

3.1. METHODOLOGICAL APPROACH: RESEARCH THROUGH PRACTICE 102

3.1.1. PARTICIPANTS 106

3.1.2. ETHICAL IMPLICATIONS 109

3.2. MUTLI-METHOD TRIANGULATION 109

3.2.1. DESIGN RESEARCH APPROACH 112

3.2.1.1. DESIGN REFLECTION TOOLS WITHIN THE RESEARCH PRACTICE 113

3.2.2. ACTION RESEARCH 116

3.2.2.1. FROM TACIT KNOWLEDGE TO EXPLICIT KNOWLEDGE 118

3.2.2.2. REFLECTIVE PRACTICE 120

3.2.2.3. PRAXIS 122

3.2.3. QUALITATIVE RESEARCH APPROACH 122

3.2.3.1. THE REPERTORY GRID TECHNIQUE 123

3.2.3.1.1. REPERTORY GRID TECHNIQUE WITHIN DESIGN RESEARCH 126

3.2.3.2. IN-DEPTH ONLINE VIDEO CALL INTERVIEW 127

3.3. RELIABILITY, VALIDITY AND RELATABILITY 129

3.4. CONCLUSIONS 130

4. RESEARCH PRACTICE 132

4.1. APPLICATION OF MULTI-METHOD TRIANGULATION IN THE PRACTICE 133

4.1.1. PARTICIPATORY PRACTICE IN THREE STAGES 135

4.2. PRACTICE OVERVIEW 136

4.2.1. STAGE ONE: HOW SENSORY PERCEPTION OF WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE 136

4.2.1.1 TEXTILE SAMPLES 138

4.2.1.1.1 RADAR CHART FROM 48 TO 12 TEXTILE SAMPLES 141

4.2.1.2. CONDUCTING THE REPERTORY GRID TECHNIQUE INTERVIEWS 146

4.2.1.2.1. INTERVIEW ONE: TACTILE UNIMODAL ANALYSIS 150

4.2.1.2.2. INTERVIEW TWO: VISUAL UNIMODAL ANALYSIS 153

4.2.1.2.3. INTERVIEW THREE: TACTILE-VISUAL BIMODAL ANALYSIS 155

4.2.2. STAGE TWO: THE EMBEDMENT OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE 156

4.2.2.1. THE DEVELOPMENT OF COMPUTER-BASED INTERFACES 157

4.2.2.1.1. COMPUTER-BASED INTERFACE ONE 165

4.2.2.1.2. COMPUTER-BASED INTERFACE TWO 166

4.2.2.1.3. COMPUTER-BASED INTERFACE THREE 168

4.2.2.1.4. COMPUTER-BASED INTERFACE FOUR 169

4.2.2.2. CONDUCTING THE COMPUTER-BASED INTERFACE INTERVIEW 171

4.2.3. STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME 173

4.2.3.1. FOUR CO-DESIGNED TEXTILE SAMPLES 176

4.2.3.2. STAGE THREE REPERTORY GRID TECHNIQUE INTERVIEW 177

4.2.3.3. FINAL CO-DESIGNED TEXTILE 179

4.2.3.4. STAGE THREE IN-DEPTH ONLINE VIDEO CALL INTERVIEW 183

4.3. CONCLUSION 186

5. ANALYSIS AND FINDINGS 188

5.1. STAGE ONE: SENSORY PERCEPTION 189

5.1.1. SENSORY PERCEPTION OF WOVEN TEXTILE SAMPLES 190

5.1.1.1. CONNECTING RGT BI-POLAR CONSTRUCTS TO THE EMOTIONAL EXPERIENCE THREE-DOMAIN FRAMEWORK 190

5.1.1.2. PARTICIPANT'S TEXTILE PROPERTIES PREFERENCES 197

5.2. STAGE TWO: COMPUTER-BASED INTERFACE 202

5.2.1. COMPUTER-LED CO-DESIGN EXPERIENCE 204

5.2.1.1. COMPUTER-BASED INTERFACE ONE 206

5.2.1.2. COMPUTER-BASED INTERFACE TWO 207

5.2.1.3. COMPUTER-BASED INTERFACE THREE 208

5.2.1.4. COMPUTER-BASED INTERFACE FOUR 209

5.2.1.5. IDEAL COMPUTER-BASED INTERFACE 210

5.3. STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME 212

5.3.1. PARTICIPANTS' DECISIONS 213

5.3.2. PARTICIPANT'S VIEWS ON COMPUTER-LED CO-DESIGN EXPERIENCE 218

5.3.3. PARTICIPANT'S SENSORY PERCEPTION OF FINAL CO-DESIGNED TEXTILE 218

5.3.4. PARTICIPANT'S RESPONSES TO COMPUTER-LED CO-DESIGN EXPERIENCE 222

5.3.5. PARTICIPANT'S FEEDBACK ON DIGITAL CODING 223

5.3.5.1. WEAVING WITH CODE 225

5.3.6. PARTICIPANT'S SUGGESTIONS 227

5.3.6.1. COLOUR 227

5.3.6.2. COVID-19 228

5.4. DISCUSSION AND CONCLUSIONS 229

6. CONCLUSION 232

6.1. SUMMARY 232

6.2. PERSONAL REFLECTION AND OUTCOMES 237

6.2.1. METHOD AND PRACTICE 237

6.2.2. GRAPHICAL VISUALISATION 239

6.3. RESEARCH CONTRIBUTIONS 240

6.4. RESEARCH LIMITATIONS 242

6.5. OPPORTUNITIES FOR FURTHER RESEARCH AND PRACTICE 244

BIBLIOGRAPHY 246

7. APPENDICES 259

7.1. APPENDIX A: PARTICIPANTS' PROFILE 259

7.2. APPENDICE B: PILOT STUDIES 260

7.2.1. PILOT STUDY ONE 260

7.2.2. PILOT STUDY TWO 266

7.2.2.1. STAGE ONE 267

7.2.2.2. STAGE TWO 269

7.2.2.2.1. INPUT & TEXT 271

7.2.2.2.2. CODE 272
7.2.2.2.3. ATTRIBUTES 274
7.2.2.2.4. ORGANISATION 274
7.2.2.3. STAGE THREE 276
7.2.2.4. OVERALL REVIEW OF THE SECOND PILOT STUDY 279
7.3. APPENDIX C: TEXTILE RADAR CHART 280
7.4. APPENDIX D: REPERTORY GRID TECHNIQUE SHEETS 305
7.5. APPENDIX E: STAGE ONE REPERTORY GRID TECHNIQUE INTERVIEWS 308
7.6. APPENDIX F: STAGE TWO REPERTORY GRID TECHNIQUE INTERVIEWS 341
7.8. APPENDIX G: STAGE THREE IN-DEPTH ONLINE VIDEO CALL INTERVIEW 405
7.8.1. Participant A > In-depth online video call interview > 02.02.2021 405
7.8.2. Participant B > In-depth online video call interview > 03.02.2021 409
7.8.3. Participant C > In-depth online video call interview > 09.02.2021 413
7.8.4. Participant D > In-depth online video call interview > 04.02.2021 418
7.8.5. Participant E > In-depth online video call interview > 20.02.2021 422
7.8.6. Participant F > In-depth online video call interview > 10.02.2021 425
7.8.7. Participant H > In-depth online video call interview > 05.02.2021 429
7.9. APPENDIX H: SCOTWEAVE FILES CO-DESIGNED TEXTILE SAMPLES 435
7.10. APPENDIX I: CO-DESIGNED TEXTILE SAMPLES AND TEXT 452
7.11. APPENDIX J: FINAL CO-DESIGNED TEXTILES 487
7.12. APPENDIX K: REFLECTIVE PRACTICE 503
7.13. APPENDIX L: COMPUTER-BASED INTERFACES 510

LIST OF FIGURES

Figure 1. 1. Woven Memories (2016). 2

Figure 1. 2. Designing with Emotional Experience: Embedded and Elicited. 4

Figure 1. 3. Designing with Emotional Experience research's practice stages. 5

Figure 1. 4. Three areas of research: Emotional Experience, digital coding within textile practice, and co-design. 6

Figure 1. 5. The process of weaving in this research practice. 15

Figure 1. 6. Research thesis structure....16

Figure 2. 1. Interpretation of Greenwald's (1998) Four-facets of a Person Self-schema.....21

Figure 2. 2. Interpretation of the correlation between Four-facets of a Persona Self-schema (Greenwald, 1988) and the speculative determinants to analyse Consumer-product Attachment (Schifferstein & Pelgrim, 2008).....22

Figure 2. 3. Interpretation of the Three Levels of the Brain (Norman, 2004). 25

Figure 2. 4. Comparison of Greenwald's (1988) Four-facets of a Persona Self-schema to Norman's (2004) Three Levels of Design. 26

Figure 2. 5. Interpretation of Jordan's (2002) pleasure-based approach....28

Figure 2. 6. Interpretation of the connections of Jordan's (2002) Pleasure-based Approach and Norman's (2004) Three Level of Design. 29

Figure 2. 7. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004) and Pleasure-based Approach (Jordan, 2003). 30

Figure 2. 8. Interpretation of the Desmet & Hekkert's (2007) Three-level of Product Experience....32

Figure 2. 9. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004), Pleasure-based Approach (Jordan, 2003) and Three-level of Product Experience (Desmet & Hekkert, 2007). 34
Figure 2. 10. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004), Pleasure-based Approach (Jordan, 2003), Three-level of Product Experience (Desmet & Hekkert, 2007) and Human-product Emotional Interactions (Alaniz & Biazzo, 2019).....35
Figure 2. 11. Interpretation of Damasio's (2000) Three Types of the Self related to the types of consciousness. 40
Figure 2. 12. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004), Pleasure-based Approach (Jordan, 2003), Three Levels of Product Experience (Desmet & Hekkert, 2007), Human-product Emotional Interaction (Alaniz & Biazzo, 2019), and Three Levels of the Self (Damasio, 2000).....41
Figure 2. 13. Interpretation of Design Rhetoric framework (Buchanan, 1989).....42
Figure 2. 14. Connection of Damasio's (2000) and Buchanan's (1989) theories.....43
Figure 2. 15. Interpretation of the Emotional Experience three-domain framework.....46
Figure 2. 16. (left) Enlargement of a woven Jacquard textile, (right) an enlargement of a 1,024-bit memory circuit made by Fairchild Semiconductor (Hearth, 1975).....50
Figure 2. 17. Kunihiko Morinaga for Anrealage 2011 collection. 55
Figure 2. 18. Eunsuk Hur, Nomadic Wonderland, 2009. 56
Figure 2. 19. Blommers/Schumm for Viktor & Rolf, Long live the immaterial, 2002 collection (Hoorsting & Snoeren, 2002). 57
Figure 2. 20. Jimin Seo’s QR woven textiles (Seo, 2015). 60
Figure 2. 21. Data bends for Archive No: 54274 (Stephens, 2016). 61

Figure 2. 22. Bilder aus Kette und Schuss (Weber, 2005).....67

Figure 2. 23. Number 6 (Struycken, 2002).....68

Figure 2. 24. Génératif (Saltet & Paradeise, 2014).....71

Figure 2. 25. Glitch Textiles (Stearns, 2012).....72

Figure 2. 26. BeatWoven (Ricketts, 2009).....73

Figure 2. 27. Unmade (Hal Watts et al., 2014).....74

Figure 2. 28. Abstract_ (Eriksen, 2015).....74

Figure 2. 29. Woven Memories (Nadal, 2016).....75

Figure 2. 30. Participant involvement during collaborative design encounters (Manzini, 2015).....80

Figure 2. 31. Re-design of Kaulio's (1998) individual involvement methods.....84

Figure 2. 32. Adaptation of Kaulio's (1998) individual involvement methods to compare co-creation, co-design and co-production.....85

Figure 3. 1. Qualitative multi-method triangulation of this research.....105

Figure 3. 2. Practice's timeline and the implementation of the multi-method triangulation in each phase of the practice.....111

Figure 3. 3. Newman's (2010) design squiggle.....113

Figure 3. 4. Adaptation of Newman's (2010) design squiggle.....114

Figure 3. 5. Iteration of the design process based on Newman's (2010) design squiggle.....115

Figure 3. 6. Reflective practice process in this research.....121

Figure 3. 7. Repertory Grid Technique interview sheet for practice's stage one of this research.....125

Figure 3. 8. Connection of multi-method triangulation to key areas of research's literature review.....131

Figure 4. 1. Qualitative Multi-method triangulation within the practice investigation. 134

Figure 4. 2. The three stages of the practice investigation. 136

Figure 4. 3. Textile fibres used in this research. 139

Figure 4. 4. Weave structures used in this research.....140

Figure 4. 5. 48 textile samples as a result of yarns and weave structures combinations. 141

Figure 4. 6. Radar chart to analyse the sensory properties of textiles based on Karan et al.'s (2009) research. 142

Figure 4. 7. Radar chart textile samples 1 to 6. 144

Figure 4. 8. Radar chart from textile samples 7 to 12. 145

Figure 4. 9. 12 textile samples. 146

Figure 4. 10. Graphic representation of the set-up of the textile samples, participant and researcher in each session of stage one. 149

Figure 4. 11. Repertory Grid Technique interview sheet. 150

Figure 4. 12. Participant evaluating textile samples using the tactile sense during session one of stage one. 152

Figure 4. 13. Participant evaluating textile samples using the visual sense during session two of stage one. 154

Figure 4. 14. Participant evaluating textile samples using the tactile and visual senses during session three of stage one. 156

Figure 4. 15. ASCII code and random code. 158

Figure 4. 16. Textile guide to complement the computer-based interfaces. 161

Figure 4. 17. Computer-based interfaces' attributes. 164
Figure 4. 18. Computer-based interface one. 166
Figure 4. 19. Computer-based interface two. 167
Figure 4. 20. Computer-based interface three – second page. 169
Figure 4. 21. Computer-based interface four – third page. 170
Figure 4. 22. Stage two RGT bi-polar constructs. 172
Figure 4. 23. Test of weave structures and yarns. 175
Figure 4. 24. Participant evaluating a textile using textile sense for session one of stage three. 179
Figure 4. 25. TextielLab production of the eight final co-designed textiles. 180
Figure 4. 26. Participant D final co-designed textile details. 181
Figure 4. 27. Participant's package for the last session. 185

Figure 5. 1. Distinction between RGT bi-polar construct, RGT construct, RGT contrast, and RGT attribute 191
Figure 5. 2. Top) Participant E RGT interview sheet of stage one's third interview. Bottom) Participant E cluster analysis & Emotional Experience bi-polar construct analysis of stage one's third interview. 198
Figure 5. 3. Visual communication during the collaboration with the computer engineer. .204
Figure 5. 4. Ideal computer-based interface. 211

Figure 7. 1. Textile samples in the first pilot study. 264
Figure 7. 2. Second pilot study structure. 266
Figure 7. 3. Volunteer during interview one of Stage one analysing the textiles, based on tactile unimodal analysis 268

Figure 7. 4. Representation of the translation of ASCII code to a graphic pattern. 273

Figure 7. 5. Co-designed textile samples. 277

Figure 7. 6. Tactile unimodal analysis of co-designed textile sample. 278

Figure 7. 7. Radar chart textile samples 01 and 02.....281

Figure 7. 8. Radar chart textile samples 03 and 04.....282

Figure 7. 9. Radar chart textile samples 05 and 06.....283

Figure 7. 10. Radar chart textile samples 07 and 08.....284

Figure 7. 11. Radar chart textile samples 09 and 10.....285

Figure 7. 12. Radar chart textile samples 11 and 12.....286

Figure 7. 13. Radar chart textile samples 13 and 14.....287

Figure 7. 14. Radar chart textile samples 15 and 16.....288

Figure 7. 15. Radar chart textile samples 17 and 18.....289

Figure 7. 16. Radar chart textile samples 19 and 20.....290

Figure 7. 17. Radar chart textile samples 21 and 22.....291

Figure 7. 18. Radar chart textile samples 23 and 24.....292

Figure 7. 19. Radar chart textile samples 25 and 26.....293

Figure 7. 20. Radar chart textile samples 27 and 28.....294

Figure 7. 21. Radar chart textile samples 29 and 30.....295

Figure 7. 22. Radar chart textile samples 31 and 32.....296

Figure 7. 23. Radar chart textile samples 33 and 34.....297

Figure 7. 24. Radar chart textile samples 35 and 36.....298

Figure 7. 25. Radar chart textile samples 37 and 38.....299

Figure 7. 26. Radar chart textile samples 39 and 40.....300

Figure 7. 27. Radar chart textile samples 41 and 42.....301

Figure 7. 28. Radar chart textile samples 43 and 44.....302

Figure 7. 29. Radar chart textile samples 45 and 46.....303

Figure 7. 30. Radar chart textile samples 47 and 48.....304

Figure 7. 31. Stage one Repertory Grid Technique sheet.....305

Figure 7. 32. Stage two Repertory Grid Technique sheet.....306

Figure 7. 33. Stage three Repertory Grid Technique sheet. Each participant had their own RGT bi-polar constructs. 307

Figure 7. 34.ScotWeave file for Participant A co-designed textile sample one. 435

Figure 7. 35. ScotWeave file for Participant A co-designed textile sample two. 436

Figure 7. 36. ScotWeave file for Participant A co-designed textile sample three. 436

Figure 7. 37. ScotWeave file for Participant A co-designed textile sample four. 437

Figure 7. 38. ScotWeave file for Participant B co-designed textile sample one.....437

Figure 7. 39. ScotWeave file for Participant B co-designed textile sample two.....438

Figure 7. 40. ScotWeave file for Participant B co-designed textile sample three. 438

Figure 7. 41. ScotWeave file for Participant B co-designed textile sample four. 439

Figure 7. 42. ScotWeave file for Participant C co-designed textile sample one.....439

Figure 7. 43. ScotWeave file for Participant C co-designed textile sample two.....440

Figure 7. 44. ScotWeave file for Participant C co-designed textile sample three. 440

Figure 7. 45. ScotWeave file for Participant C co-designed textile sample four. 441

Figure 7. 46. ScotWeave file for Participant D co-designed textile sample one. 441

Figure 7. 47. ScotWeave file for Participant D co-designed textile sample two. 442

Figure 7. 48. ScotWeave file for Participant D co-designed textile sample three. 442

Figure 7. 49. ScotWeave file for Participant D co-designed textile sample four. 443

Figure 7. 50. ScotWeave file for Participant E co-designed textile sample one. 443

Figure 7. 51. ScotWeave file for Participant E co-designed textile sample two.....444
Figure 7. 52. ScotWeave file for Participant E co-designed textile sample three. 444
Figure 7. 53. ScotWeave file for Participant E co-designed textile sample four. 445
Figure 7. 54. ScotWeave file for Participant F co-designed textile sample one. 445
Figure 7. 55. ScotWeave file for Participant F co-designed textile sample two. 446
Figure 7. 56. ScotWeave file for Participant F co-designed textile sample three. 446
Figure 7. 57. ScotWeave file for Participant F co-designed textile sample four. 447
Figure 7. 58. ScotWeave file for Participant G co-designed textile sample one. 447
Figure 7. 59. ScotWeave file for Participant G co-designed textile sample two. 448
Figure 7. 60. ScotWeave file for Participant G co-designed textile sample three.....448
Figure 7. 61. ScotWeave file for Participant G co-designed textile sample four.....449
Figure 7. 62. ScotWeave file for Participant H co-designed textile sample one. 449
Figure 7. 63. ScotWeave file for Participant H co-designed textile sample two. 450
Figure 7. 64. ScotWeave file for Participant H co-designed textile sample three.....450
Figure 7. 65. ScotWeave file for Participant H co-designed textile sample four.....451
Figure 7. 66. Participant A co-designed textile sample one. 452
Figure 7. 67. Participant A co-designed textile sample two. 453
Figure 7. 68. Participant A co-designed textile sample three.....454
Figure 7. 69. Participant A co-designed textile sample four.....455
Figure 7. 70. Participant B co-designed textile sample one. 456
Figure 7. 71. Participant B co-designed textile sample two. 458
Figure 7. 72. Participant B co-designed textile sample three.....459
Figure 7. 73. Participant B co-designed textile sample four.....461
Figure 7. 74. Participant C co-designed textile sample one. 463

Figure 7. 75. Participant C co-designed textile sample two. 464

Figure 7. 76. Participant C co-designed textile sample three. 465

Figure 7. 77. Participant C co-designed textile sample four. 466

Figure 7. 78. Participant D co-designed textile sample one. 467

Figure 7. 79. Participant D co-designed textile sample two. 468

Figure 7. 80. Participant D co-designed textile sample three. 469

Figure 7. 81. Participant D co-designed textile sample four. 470

Figure 7. 82. Participant E co-designed textile sample one. 471

Figure 7. 83. Participant E co-designed textile sample two. 472

Figure 7. 84. Participant E co-designed textile sample three. 473

Figure 7. 85. Participant E co-designed textile sample four. 474

Figure 7. 86. Participant F co-designed textile sample one. 475

Figure 7. 87. Participant F co-designed textile sample two. 476

Figure 7. 88. Participant F co-designed textile sample three. 477

Figure 7. 89. Participant F co-designed textile sample four. 478

Figure 7. 90. Participant G co-designed textile sample one. 479

Figure 7. 91. Participant G co-designed textile sample two. 480

Figure 7. 92. Participant G co-designed textile sample three. 481

Figure 7. 93. Participant G co-designed textile sample four. 482

Figure 7. 94. Participant H co-designed textile sample one. 483

Figure 7. 95. Participant H co-designed textile sample two. 484

Figure 7. 96. Participant H co-designed textile sample three. 485

Figure 7. 97. Participant H co-designed textile sample four. 486

Figure 7. 98. Participant A final co-designed textile. 487

Figure 7. 99. Participant A final co-designed textile details.Figure 7. 100. Participant A final co-designed textile. 487
Figure 7. 101. Participant A final co-designed textile. 488
Figure 7. 102. Participant B final co-designed textile. 489
Figure 7. 103. Participant B final co-designed textile. 490
Figure 7. 104. Participant C final co-designed textile. 491
Figure 7. 105. Participant C final co-designed textile details. 492
Figure 7. 106. Participant D final co-designed textile. 493
Figure 7. 107. Participant D final co-designed textile details. 494
Figure 7. 108. Participant E final co-designed textile. 495
Figure 7. 109. Participant E final co-designed textile details. 496
Figure 7. 110. Participant F final co-designed textile. 497
Figure 7. 111. Participant F final co-designed textile details. 498
Figure 7. 112. Participant G final co-designed textile. 499
Figure 7. 113. Participant G final co-designed textile details. 500
Figure 7. 114. Participant H final co-designed textile. 501
Figure 7. 115. Participant H final co-designed textile details. 502
Figure 7. 116. Deciding which natural yarn should be used in this research (full practice)..503
Figure 7. 118. Testing yarns sample to weave the 48 textile samples (stage one). 504
Figure 7. 119. 16-shaft dobby loom, tools, yarns, and weaving images (stage one). 505
Figure 7. 120. Images and notes while weaving the 48 textile samples (stage one). 506
Figure 7. 121. Images and notes while weaving the 48 textile samples (stage one). 507
Figure 7. 122. Textile sample for co-designed textile samples (stage three). 508
Figure 7. 123. notes taken when weaving the co-designed textile samples (stage three). ..509

LIST OF TABLES

Table 2. 1. Adaptation of Thallmaier (2015) Customers perceived value in mass-customisation and co-design. 97

Table 4. 1. Participant's choice of co-designed textile samples vs final co-designed textile sample. 177

Table 4. 2. Characteristics of participants' final co-designed textiles. 182

Table 5. 1. RGT attributes based on the sensory evaluation and Emotional Experience three-domain framework. 193

Table 5. 2. Connection between textiles, sensory properties, and Emotional Experience three-domain framework. 196

Table 5. 3. Participants' textile samples preferences. 201

Table 5. 4. Participants' preferences of technical aspects of textiles. 202

Table 5. 5. Associations of the bi-polar construct to Thallmaier's (2015) presentation of benefits and disadvantages of product and process. 205

Table 5. 6. Correlation between computer-based interfaces and textiles. 213

Table 5. 7. Participants' preferences on textile samples based on sensory perception. 215

Table 5. 8. Participants' preferences on the digital coding variables. 217

Table 5. 9. Participants' feedback during session two of stage three. 221

Table 7. 1. Participants' information chart. 259

Table 7. 2. First pilot study structure. 262

Table 7. 3. Adaptation of the RGT after the first pilot study. 265

Table 7. 4. Factors to be analysed on each computer-based interface. 271

Table 7. 5. Factors to be analysed on each computer-based interface after second pilot study. ……275
Table 7. 6. Participant A - tactile unimodal analysis RGT sheet. …… 308
Table 7. 7. Participant A - tactile unimodal analysis RGT sheet focus cluster analysis. …… 309
Table 7. 8. Participant A - visual unimodal analysis RGT sheet. …… 309
Table 7. 9. Participant A - visual unimodal analysis RGT sheet focus cluster analysis. …… 310
Table 7. 10. Participant A - tactile-visual bimodal analysis RGT sheet. …… 310
Table 7. 11. Participant A - tactile-visual bimodal analysis RGT sheet focus cluster analysis. …… 311
Table 7. 12. Participant B - tactile unimodal analysis RGT sheet. …… 312
Table 7. 13. Participant B - tactile unimodal analysis RGT sheet focus cluster analysis. …… 313
Table 7. 14. Participant B - visual unimodal analysis RGT sheet. …… 314
Table 7. 15. Participant B - visual unimodal analysis RGT sheet focus cluster analysis. …… 314
Table 7. 16. Participant B - tactile-visual bimodal analysis RGT sheet. …… 315
Table 7. 17. Participant B - tactile-visual bimodal analysis RGT sheet focus cluster analysis. …… 316
Table 7. 18. Participant C - tactile unimodal analysis RGT sheet. …… 317
Table 7. 19. Participant C - tactile unimodal analysis RGT sheet focus cluster analysis. …… 318
Table 7. 20. Participant C - visual unimodal analysis RGT sheet. …… 319
Table 7. 21. Participant C - visual unimodal analysis RGT sheet focus cluster analysis. …… 319
Table 7. 22. Participant C - tactile-visual bimodal analysis RGT sheet. …… 320
Table 7. 23. Participant C - tactile-visual bimodal analysis RGT sheet focus cluster analysis. …… 320
Table 7. 24. Participant D - tactile unimodal analysis RGT sheet. …… 321

Table 7. 25. Participant D - tactile unimodal analysis RGT sheet focus cluster analysis. ……322

Table 7. 26. Participant D - visual unimodal analysis RGT sheet. ……322

Table 7. 27. Participant D - visual unimodal analysis RGT sheet focus cluster analysis. …….323

Table 7. 28. Participant D - tactile-visual bimodal analysis RGT sheet. ……..323

Table 7. 29. Participant D - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

…… 324

Table 7. 30. Participant E - tactile unimodal analysis RGT sheet. ……325

Table 7. 31. Participant E - tactile unimodal analysis RGT sheet focus cluster analysis. …… 326

Table 7. 32. Participant E - visual unimodal analysis RGT sheet. ……326

Table 7. 33. Participant E - visual unimodal analysis RGT sheet focus cluster analysis. ……. 327

Table 7. 34. Participant E - tactile-visual bimodal analysis RGT sheet. ……327

Table 7. 35. Participant E - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

…… 328

Table 7. 36. Participant F - tactile unimodal analysis RGT sheet. ……329

Table 7. 37. Participant F - tactile unimodal analysis RGT sheet focus cluster analysis. …….330

Table 7. 38. Participant F - visual unimodal analysis RGT sheet. ……..330

Table 7. 39. Participant F - visual unimodal analysis RGT sheet focus cluster analysis. ……. 331

Table 7. 40. Participant F - tactile-visual bimodal analysis RGT sheet. ……331

Table 7. 41. Participant F - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

…… 332

Table 7. 42. Participant G - tactile unimodal analysis RGT sheet. ……..333

Table 7. 43. Participant G - tactile unimodal analysis RGT sheet focus cluster analysis. ……334

Table 7. 44. Participant G - visual unimodal analysis RGT sheet. ……334

Table 7. 45. Participant G - visual unimodal analysis RGT sheet focus cluster analysis. …….335

Table 7. 46. Participant G - tactile-visual bimodal analysis RGT sheet. ……..335

Table 7. 47. Participant G - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

…… 336

Table 7. 48. Participant H - tactile unimodal analysis RGT sheet. ……..337

Table 7. 49. Participant H - tactile unimodal analysis RGT sheet focus cluster analysis. ……338

Table 7. 50. Participant H - visual unimodal analysis RGT sheet. ……338

Table 7. 51. Participant H - visual unimodal analysis RGT sheet focus cluster analysis. …….339

Table 7. 52. Participant H - tactile-visual bimodal analysis RGT sheet analysis. ……..340

Table 7. 53. Participant H - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

…… 340

Table 7. 54. Participant A – computer-based interfaces analysis RGT sheet. …… 341

Table 7. 55. Participant A – computer-based interfaces analysis RGT sheet focus cluster analysis. ……342

Table 7. 56. Participant B – computer-based interfaces analysis RGT sheet. ……343

Table 7. 57. Participant B – computer-based interfaces analysis RGT sheet focus cluster analysis. ……344

Table 7. 58. Participant C – computer-based interfaces analysis RGT sheet. ……..345

Table 7. 59. Participant C – computer-based interfaces analysis RGT sheet focus cluster analysis. ……346

Table 7. 60. Participant D – computer-based interfaces analysis RGT sheet. …… 347

Table 7. 61. Participant D – computer-based interfaces analysis RGT sheet focus cluster analysis. ……. 348

Table 7. 62. Participant E – computer-based interfaces analysis RGT sheet. ……..349

Table 7. 63. Participant E – computer-based interfaces analysis RGT sheet focus cluster analysis. ……350
Table 7. 64. Participant F – computer-based interfaces analysis RGT sheet. ……351
Table 7. 65. Participant F – computer-based interfaces analysis RGT sheet focus cluster analysis. ……352
Table 7. 66. Participant G – computer-based interfaces analysis RGT sheet. …… 353
Table 7. 67. Participant G – computer-based interfaces analysis RGT sheet focus cluster analysis. ……354
Table 7. 68. Participant H – computer-based interfaces analysis RGT sheet. …… 355
Table 7. 69. Participant H – computer-based interfaces analysis RGT sheet focus cluster analysis. ……356
Table 7. 70. Participant A - stage three tactile unimodal analysis RGT sheet. ……357
Table 7. 71. Participant A - stage three tactile unimodal analysis RGT sheet focus analysis. …… 358
Table 7. 72. Participant A - stage three visual unimodal analysis RGT sheet. …… 359
Table 7. 73. Participant A - stage three visual unimodal analysis RGT sheet focus analysis. 360
Table 7. 74. Participant A - stage three tactile-visual bimodal analysis RGT sheet. ……361
Table 7. 75. Participant A - stage three tactile-tactile bimodal analysis RGT sheet focus analysis. ……362
Table 7. 76. Participant B - stage three tactile unimodal analysis RGT sheet. ……363
Table 7. 77. Participant B - stage three tactile unimodal analysis RGT sheet focus analysis. …… 364
Table 7. 78. Participant B - stage three visual unimodal analysis RGT sheet. …… 365
Table 7. 79. Participant B - stage three visual unimodal analysis RGT sheet focus analysis. 366

Table 7. 80. Participant B - stage three tactile-visual bimodal analysis RGT sheet. 367

Table 7. 81. Participant B - stage three tactile-visual bimodal analysis RGT sheet focus analysis. 368

Table 7. 82. Participant C - stage three tactile unimodal analysis RGT sheet. 369

Table 7. 83. Participant C - stage three tactile unimodal analysis RGT sheet focus analysis. 370

Table 7. 84. Participant C - stage three visual unimodal analysis RGT sheet. 371

Table 7. 85. Participant C - stage three visual unimodal analysis RGT sheet focus analysis. 372

Table 7. 86. Participant C - stage three tactile-visual bimodal analysis RGT sheet. 373

Table 7. 87. Participant C - stage three tactile-visual bimodal analysis RGT sheet. 374

Table 7. 88. Participant D - stage three tactile unimodal analysis RGT sheet. 375

Table 7. 89. Participant D - stage three tactile unimodal analysis RGT sheet focus analysis. 376

Table 7. 90. Participant D - stage three visual unimodal analysis RGT sheet. 377

Table 7. 91. Participant D - stage three tactile unimodal analysis RGT sheet focus analysis. 378

Table 7. 92. Participant D - stage three tactile-visual bimodal analysis RGT sheet. 379

Table 7. 93. Participant D - stage three tactile-visual bimodal analysis RGT sheet focus analysis. 380

Table 7. 94. Participant E - stage three tactile unimodal analysis RGT sheet. 381

Table 7. 95. Participant E - stage three tactile unimodal analysis RGT sheet focus analysis. 382

Table 7. 96. Participant E - stage three visual unimodal analysis RGT sheet. 383

Table 7. 97. Participant E - stage three visual unimodal analysis RGT sheet focus analysis. 384

Table 7. 98. Participant E - stage three tactile-visual bimodal analysis RGT sheet. 385

Table 7. 99. Participant E - stage three tactile-visual bimodal analysis RGT sheet focus analysis. 386

Table 7. 100. Participant F - stage three tactile unimodal analysis RGT sheet. 387

Table 7. 101. Participant F - stage three tactile unimodal analysis RGT sheet focus analysis. 388

Table 7. 102. Participant F - stage three visual unimodal analysis RGT sheet. 389

Table 7. 103. Participant F - stage three visual unimodal analysis RGT sheet focus analysis. 390

Table 7. 104. Participant F - stage three tactile-visual bimodal analysis RGT sheet. 391

Table 7. 105. Participant F - stage three tactile-visual bimodal analysis RGT sheet. 392

Table 7. 106. Participant G - stage three tactile unimodal analysis RGT sheet. 393

Table 7. 107. Participant G - stage three tactile unimodal analysis RGT sheet focus analysis. 394

Table 7. 108. Participant G - stage three visual unimodal analysis RGT sheet. 395

Table 7. 109. Participant G - stage three visual unimodal analysis RGT sheet focus analysis. 396

Table 7. 110. Participant G - stage three tactile-visual bimodal analysis RGT sheet. 397

Table 7. 111. Participant G - stage three tactile-tactile bimodal analysis RGT sheet focus analysis. 398

Table 7. 112. Participant H - stage three tactile unimodal analysis RGT sheet. 399

Table 7. 113. Participant H - stage three tactile unimodal analysis RGT sheet focus analysis. 400

Table 7. 114. Participant H - stage three visual unimodal analysis RGT sheet. 401

Table 7. 115. Participant H - stage three visual unimodal analysis RGT sheet focus analysis. …… 402

Table 7. 116. Participant H - stage three tactile-visual bimodal analysis RGT sheet……..403

Table 7. 117. Participant H - stage three tactile-visual bimodal analysis RGT sheet focus analysis. ……404

GLOSSARY OF TERMS

Aesthetics of code: is one of the three categories within the use of code in the weaving practice developed in this research. It refers to the aesthetics and similarities of components of digital coding such as pixels, bits and bytes.

ASCII code: American Standard Code for Information Interchange which is a character encoding system for electronic communication.

Binary code: a two-symbol system (usually 0 and 1) used to represent text or information.

Co-design: this research understands the term as the democratic collaboration and cooperation of designer and individual in the design development process. In this study, *designer* refers to the practitioner responsible for the design project, while *individual* refers to those who participate in the design phase.

Cognitive domain: for the purpose of this research, cognitive domain belongs to Emotional Experience three-domain framework and refers to the conscious recognition and satisfaction of an object; this domain is subjective to the individual's background.

Computer-based interface: an off-line interface designed purposefully for this research, which responds to computer-led co-design experience.

Computer-led co-design experience: is the democratic collaborative design approach in which the designer and individual play an active role via offline digital computer tools and tangible textile guides, where the individual is the beneficiary of the final output.

Diamond weave structure: weave pattern where the interlacing of the yarns shows a diamond pattern on the cloth.

Digital coding: the binary codification such as ASCII to represent characters, letters or symbols.

Double-cloth: compound woven fabric where two sets of warp yarns and weft yarns allow the face and back fabrics to show completely different patterns. Some yarns from one fabric interlace with the other fabric so that the fabrics are held together (Gale & Kaur, 2002).

Draw loom: a loom, which requires a 'draw boy' or 'liseuse', who stands on top of the loom to select and draw up the group of warp ends require to elaborate difficult weave patterns, such as floral motifs.

Ends per inch: the number of warp picks per inch (Gale & Kaur, 2002).

Emotional domain: for the purpose of this research, emotional domain belongs to Emotional Experience three-domain framework and refers to the cognitive elaboration linked to an emotional factor.

Emotional Experience: refers to the intangible meanings, associations and connections that an individual imbues the object with. *Emotional Experience* implies that the object has an emotional significance and becomes a vessel for past events and experiences that in turn can trigger *Emotional Experience* itself. It can occur at any stage of the object's lifecycle, from the prototype phase, during the ownership of it, to after parting from it.

Emotional Experience three-domain framework: used to analyse individual's *Emotional Experience* based on three domains: sensory domain, cognitive domain and emotional domain.

Four-shaft loom: a weaving loom with four shafts.

Half basket weave structure: weave pattern where the interlacing of the yarns looks similar to the weave of a basket.

Herringbone weave structure: twill fabric where the direction of the twill is reversed, producing a pattern resembling herring bones.

Hidden side of code: is one of the three categories within the use of code in the weaving practice developed in this research. The term refers to weaving the reverse of a digital image.

In-store co-design: refers to the act of co-designing a product in-store with the help of a designer, and interacting with materials during the process (Herd, 2012).

Jacquard textile: fabric woven on a Jacquard loom, where the patterning mechanism allows individual control on any interlacing of up to several hundred warp threads (Gale & Kaur, 2002).

Jacquard loom: enables the automation of highly complex patterns and realistic imagery to be woven using wooden punch cards or digital files (Gale & Kaur, 2002).

Loose ends: the weft ends that are not interlaced in the back face of a weaving textile and hang loose.

Making of code: is one of the three categories within the use of code in the weaving practice developed in this research. It refers to the making of the digital code and what the code is designed to accomplish, affecting the aesthetics and the final outcome.

Plain weave structure: most common and simplest woven structure where each warp end runs over one pick and under the next pick, and each weft end runs over one end and under the next.

Punched card: system used in Jacquard looms to weave difficult patterns, substituting the draw boy.

Radar chart: consists of a complex form that displays several qualitative axes in a circular chart.

Random code: is a 'sequence of random variables describing a process whose outcomes do not follow a deterministic pattern, but follow an evolution described by probability distributions' (Stephens, 2019: xxiii).

Repertory Grid Technique (RGT): is a highly structured interview method which is centred around the interviewee's own words and construction of the world. It was created by George A. Kelly (1955), an American psychologist, therapist, educator and personality theorist, to elicit constructs when investigating patients' personal relationships and situations in life under the umbrella of Personal Construct Theory.

Rep Plus software: a Repertory Grid Technique conceptual representation software, to analyse participant's reactions towards the practice of the research.

RGT bi-polar constructs: refers to the anticipation and explanation of events in an individual's world through organisation of perceptions. Every statement is placed at opposite ends of a pole.

RGT elements: represent the content area under study and illustrate the topic. The elements can be preselected by the researcher or created by the interviewee.

RGT rating system: evaluates each element based on the *bi-polar constructs* (Feixas and Cornejo, 1996).

RGT topic: represents the researcher's objectives and determines the subject of the interview.

Sateen weave structure: woven structure where the maximum amount of weft shows on the face.

Sensory domain: is one of the three domains of Emotional Experience three-domain framework. It consists of engaging the sensory perception of the surroundings, e.g. through touch and vision, creating positive bodily feedback.

Sensory perception: refers to the holistic process of interaction with materials, not only the sensory properties of materials but also the individual's feelings beyond the sensory domain, including emotional and semantic domains (Karana et al, 2014).

Single-cloth: a one layer cloth, where the weave structures have a front and a back face (Gale & Kaur, 2002).

Shaft: rectangular frame which holds a number of healds. Alternative name for healds frame (Gale & Kaur, 2002).

Tablet weaving: the use of cards as shafts to lift the warp ends.

TC-1 loom: allows the weaver to control every single thread independently similar to the Jacquard loom, by using a computer connected directly to the loom. The loom reads digital files which are controlled by a weaving software.

Twill weave structure: weave pattern where the interlacing of the yarns shows a diagonal pattern on the cloth.

Undyed yarn: a continuous length of fibre that has not been dyed and is strong enough to be processed into fabric.

Warp: the longitudinal yarns in a woven fabric parallel to the selvedges (Gale & Kaur, 2002).

Weaving: method of constructing cloth by interlacing warp and weft yarns (Gale & Kaur, 2002).

Weave structure: the combination between the warp and weft which creates patterns on the cloth.

Web-based co-design: is *'*the systematic and facilitated process for collaborative design in which users play an active role via online tools*'* (Friedrich, 2013: 58).

Weft: the yarns in a woven fabric that run widthways, ie. From selvedge to selvedge (Gale & Kaur, 2002).

Woven textile: a textile made using the weaving technique.

1. INTRODUCTION

1.1. RESEARCH GENESIS

Over the past eight years my practice has focused on the emotional relationship between objects and people, specifically through woven textiles, and connecting traditional crafts with new technology. Woven Memories (Nadal, 2016) (Figure 1.1) was conceived as a practice-based MA project to generate emotional value during the process of co-designing scarves by using digital coding to transcribe personal past events into abstract patterns. Through conducting the project, I encountered two other significant textile works that codified text into textile accessories, Abstract_ (Eriksen, 2015) and Binary Scarf (Meech, 2016). Whereas Meech's Binary Scarf focused on using ASCII code to translate a quote from Ada Lovelace, 'The Analytical Engine weaves algebraic patterns just as Jacquard loom weaves flowers and leaves. Ada Lovelace 1943' (Meech, 2016: online); Eriksen's Abstract_ and my project speculated on how to create textiles with an emotional connection by inviting individuals to have an active role during the making and the codification of text into textiles. Both projects created a web-based interface providing an area to type a text and an area for aesthetic personalisation, excluding sensory perception of the textiles as a complementary element for the elicitation of emotional connections.

Even though Woven Memories was developed for commercial purposes, it had potential for further academic research as the three areas of study, on which this topic is centred, have not been evaluated together. There is literature regarding the connection between textiles and emotional experience but that excludes the digital coding element, and there is literature

which explores the connection between textile and digital coding but does not pay attention to the emotional element. This thesis presents the connections between the three areas of study under one research aim, paying particular attention to the use of digital coding as a tool of co-design woven textiles that elicit Emotional Experience.

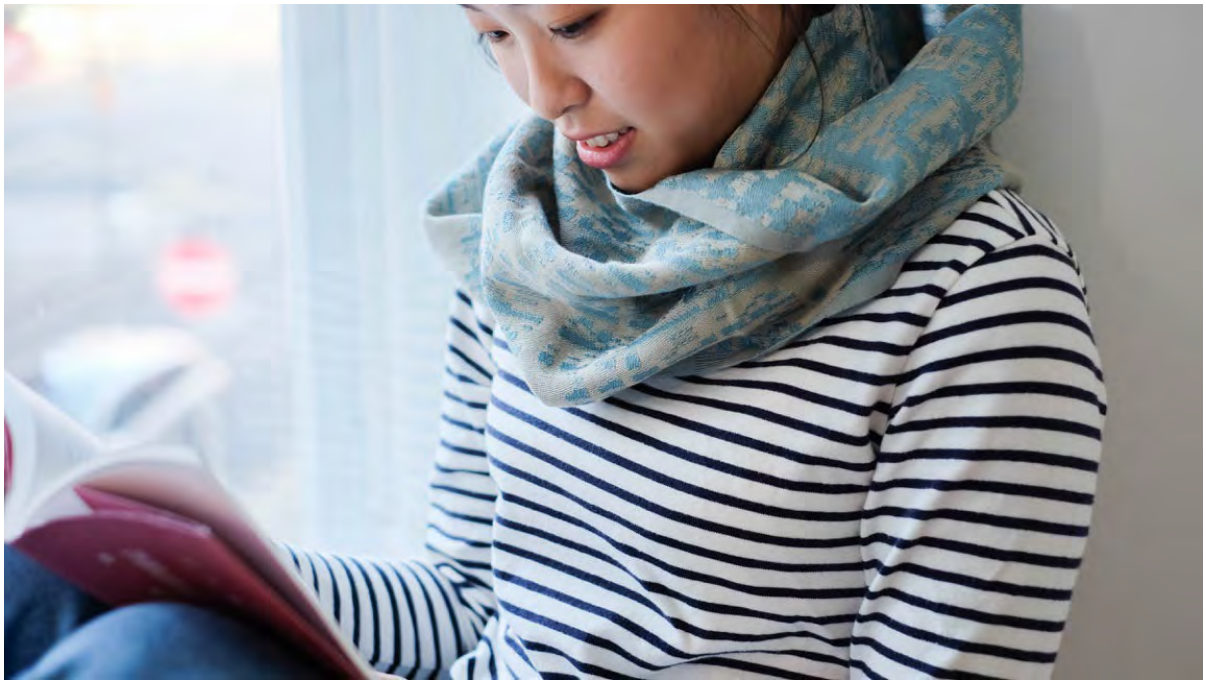


Figure 1. 1. Woven Memories (2016).

1.2. EMOTIONAL EXPERIENCE DEFINITION

Emotional Experience is an existing term used throughout this research to encompass specific connotations. Emotional Experience builds on Schifferstein & Pelgrim's (2008) and Fleetwood-Smith et al.'s (2019) work to refer to the intangible meanings and associations that an individual imbues an object with. Emotional Experience asserts that the object has an emotional significance for the individual. The Emotional Experience can occur at any stage of the object's lifecycle that intersects with the individual: at the prototype phase, during the ownership of it, and after parting from it.

Solomon (1986), Arnould & Price (1993), Mugge & Schifferstein (2005), Masuch & Hefferon (2014) and Fleetwood-Smith et al. (2019) use the term *attachment* to refer to the intangible bond between a garment and a person. However, this research argues that the intangible bond goes beyond attachment and contains a set of experiences such as the actions of making, buying, and wearing a garment, and the resulting emotional connection that these elicit in the person. Therefore, the concept of the intangible bond being instilled through the creative process as well as the interaction with the final outcome/product is reflected in this research by the use of the term *experience*, instead of *attachment*. To this end, this research intends to identify how the textile can elicit intangible meanings and associations from the individual using a co-design process. The focus point of the research is not on designing a specific emotion into a digital Jacquard woven textile but instead eliciting Emotional Experience from it.

1.2.1. DESIGNING WITH EMOTIONAL EXPERIENCE

Emotional Experience within the design process is created bidirectional (Andreoletti et al., 2022), by embedding or eliciting Emotional Experience in the artifact (Figure 1.2). When embedding Emotional Experience in the artifact, it becomes a vessel for past events, situations and people, and cannot be designed. For instance, an embedded Emotional Experience in an artifact can be an old favourite T-Shirt that the individual associates with special moments in their life. By contrast, eliciting Emotional Experience refers to a new experience evoked by the artifact; therefore, the artifact brings new meaningful associations. To this end, artifacts can be conceived to stimulate and provoke an Emotional Experience. An example of eliciting Emotional Experience in an artifact is a personalised cushion using elements of the individual's childhood experience as a fabric's pattern.

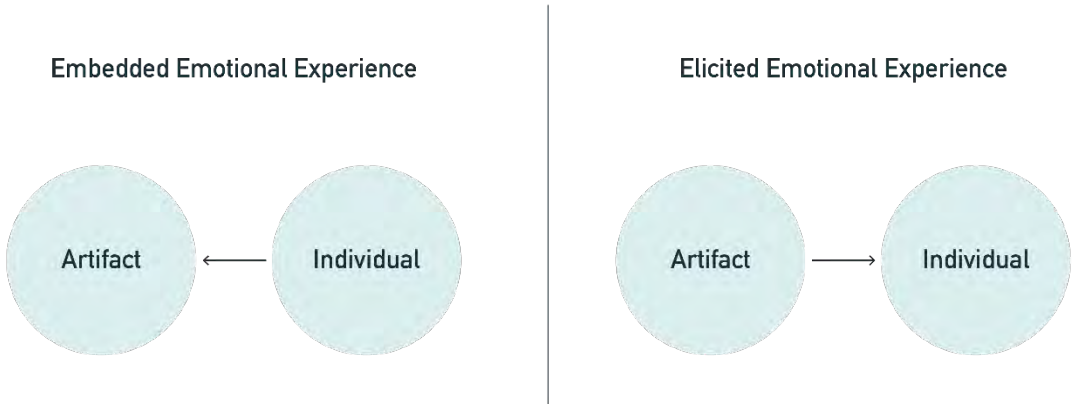


Figure 1. 2. Designing with Emotional Experience: Embedded and Elicited.

The practice of this research uses both eliciting and embedding Emotional Experience through the three stages of the co-design process (section 4.1.1) to answer the research question

(Figure 1.3). During Stage One, the research analyses elements of woven textiles that have emotionally significant associations for the participant that are explored by using sensory perception of textiles (section 4.2.1). In Stage Two, the research embeds Emotional Experience using the participant's personal experiences in the co-design process by employing digital coding (section 4.2.2). Finally in Stage Three, the research connects elements of Stage One and Stage Two to elicit Emotional Experience through the co-design process and woven textile (section 4.2.3).

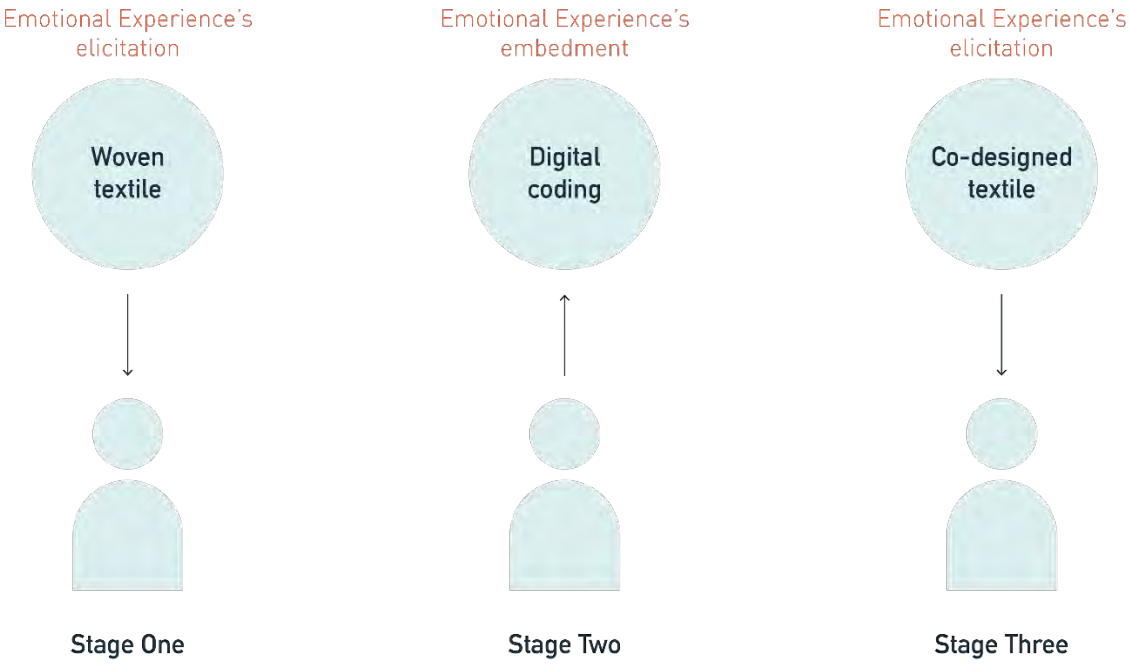


Figure 1. 3. Designing with Emotional Experience research's practice stages.

1.3. RESEARCH CONTEXT, QUESTION AND OBJECTIVES

This research investigates the elicitation of Emotional Experience through the co-design of digital Jacquard woven textiles using digital coding, which builds across three thematic areas: (i) Emotional Experience, (ii) digital coding within Jacquard woven textile practice, and (iii) co-design (Figure 1.4).

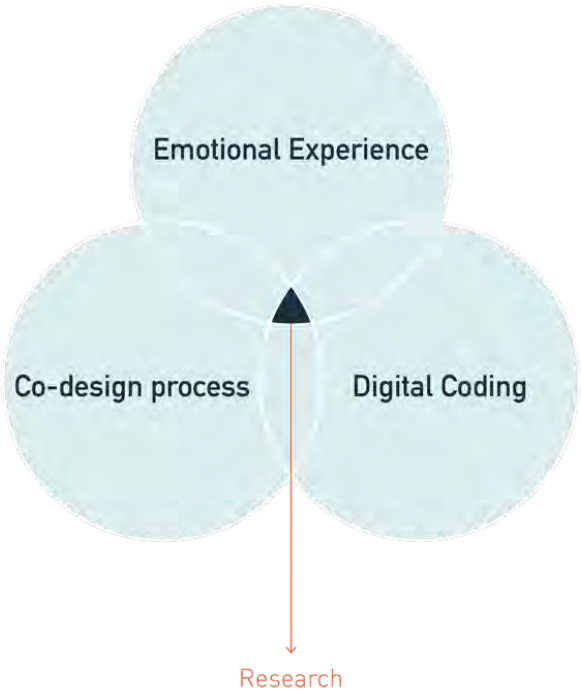


Figure 1. 4. Three areas of research: Emotional Experience, digital coding within textile practice, and co-design.

Firstly, the Emotional Experience of objects has been studied by different disciplines such as material culture, consumer behaviour and design, presenting different terminologies and definitions. Such previous research has generally focused on owned objects (Fleetwood-Smith et al., 2019). By contrast, focusing this research on engaging participants during the making of woven textiles can contribute to sustainable textile literature offering new insights into the

making of and attachment to textiles, therefore influencing the reduction of textile disposal by creating meaningful connections.

Krippendorff (2006) observes that how individuals act in relation to possessions is based not only on the objects' physical qualities but also on the meanings they have for them. A possession with little emotional significance to the owner is likely to have a low emotional attachment for them, while a possession with emotional significance has a high emotional attachment (Ball & Tasaki, 1992). Ball & Tasaki (1992) distinguish five different stages of product attachment development: pre-acquisition, early ownership, mature ownership, pre-disposal and post-disposal. Although these stages can be applied to all kinds of possessions, each stage's length can vary from one product to another. It might be that some possessions have 'strong and long-lasting relationship, a strong and short-lasting one or a weak and short-lasting one' (Borjesson & Woolley, 2008: 4).

Sartre (2003) suggests that the act of creating an object oneself can improve the chances of stimulating feelings of attachment and desirability. The creator establishes a self-identity with the object or abstract material, which prevails as long as it retains marks or other associations with the individual who brought it into existence (Belk, 1988). Csikzentmihalyi & Rochberg-Halton support Sartre when asserting that individuals invest *psychic energy* (Csikzentmihalyi & Rochberg-Halton, 1981:184) in an object which they put effort, time and attention towards its creation. The *psychic energy* and the products related to it are seen as part of the self because they have materialised from the self. Although this research agrees with Csikzentmihalyi & Rochberg-Halton's idea that effort, time and attention have an emotional impact on the object, it does not perceive an individual's participation during the creation as a self; instead, it is seen as an expression of themselves. To elicit Emotional Experience during

the pre-acquisition stage, this research designs an approach to involve participants during the making of woven textiles.

Secondly, since the 1990s, computers have become more accessible to textile practitioners; and digital coding within the textile practice has gained more interest (Kane et al., 2016). Early practitioners, such as Malcolm Cocks (1997) and Eros Tang (1997), adopted the aesthetics of coding into their practice, while others have used it as a new tool to evolve their practice and create a new language. Although two decades have passed since weavers have introduced digital coding into textile design, there is little research around this within the weaving literature (McLean et al., 2017). This investigation aims to expand the current literature by categorising the different uses of code within weaving practice.

This research reflects on the impact of using digital coding as a tool to elicit Emotional Experience within digital Jacquard woven textiles. From the textile practice perspective, three projects have introduced coding as a tool to encrypt text into patterns to engage individuals with the textile emotionally (Nadal, 2016; Meech, 2016; Eriksen, 2015). However, the creation of patterns based on encoded text has not been studied in literature on Emotional Experience, and therefore this research aims to contribute to a new area of study that integrates current research on Emotional Experience within textile practice that utilises digital coding.

Finally, to elicit Emotional Experience during the pre-acquisition stage, the research uses an approach to actively involve participants during the design phase of the woven textiles. The approach aims to provide a space for ideation, design, and creation of woven textiles under a co-design process. Herd (2012) and Friedrich (2013) present web-based co-design as the

collaborative design process in which users are active via online tools (section 2.3.4), therefore Eriksen (2015) and Nadal (2016) have used web-based co-design to create a participatory design which encrypts text into abstract pattern. However, by using web-based co-design both Eriksen's (2015) and Nadal's (2016) projects do not incorporate the impact of the tactile sensory perception of textiles in eliciting Emotional Experience. Thus, this research adapts and modifies web-based co-design in order to provide a space to evaluate how the tactile and visual sensory perception of co-designed woven textiles can elicit Emotional Experience. It looks at the benefits and disadvantages of this participatory process and evaluates participants' reactions (section 2.3.7).

The investigation is led by the research question *How can Emotional Experience be designed into digital Jacquard woven textiles using coding?*

To fulfil the research question, the following objectives have been created:

- To capture and analyse participants' sensory perception and Emotional Experience to yarns and weave structures using the Repertory Grid Technique1.
- To develop participatory co-design processes through the use of digital coding in the practice of digital Jacquard woven textiles.
- To create bespoke woven textiles, meaningful to the participant, using a co-design process.

[1] Repertory Grid Technique is a method to proceed a highly structured interview, using the interviewee's own words and construction of the world (see section 3.1.3.1)

1.4. RESEARCH APPROACH

To access participants' elicited and embedded Emotional Experience, this research adopts a computer-led co-design approach (section 2.3.4). According to Sanders & Stappers (2008), in the classical user-centred design process, the researcher brings knowledge and develops theory based on passive interactions with users, which the designer passively receives to generate ideas to solve a problem. However, in a co-design process, the roles are more fluid and participants have an active role as *experts of their experiences* (Sleeswijk Visser et al., 2005:127). The designer and researcher collaborate on providing tools for ideation and expression. To implement space for ideation and expression in this research a qualitative multi-method triangulation – action research, design research and qualitative research approaches (section 3.1) – is used to collect, reflect, and analyse participants' Emotional Experience. The research recognises that the findings and insights presented here are not purely objective analysis but a subjective construction of knowledge, celebrating the subjectivity of this practice-based research (Egon, 1990; Herd, 2012). As Egon (1990) points out, this investigation aims to create an informed and sophisticated construction by depicting participants' constructions as accurately as possible while at the same time comparing and contrasting their constructions.

The research's practice uses digital coding as a co-design tool to design digital Jacquard woven textiles, referencing key work at the forefront of textile and digital coding such as Stephens (2018), Seo (2015), Clarke & Harris (2012), and Jefferies &Thompson (2017). It also reflects on Victoria Mitchells' paper *Textiles, Text and Techne* (1997), where textile becomes a kind of speaking and for language a kind of making.

1.4.1. PRACTICE-BASED APPROACH

This research is practice-based, where an iterative practice informs the investigation, presenting a combination of elements of the practice work with a written analysis (Chapter Four). My expertise in weaving plays a key role in the practice of the research by approaching Emotional Experience through the lens of the designer. The process and outcomes of the practice work generate new insights. To ensure its rigour, the literature review - which is conducted alongside the practice - frames the focus, purpose and limits of the investigation (Chapter Two). The qualitative multi-method triangulation provides a reflective approach by capturing the elements of the iterative reflection through practice and therefore ensures its validity (Chapter Three).

One distinction that Nova (2020) presents between practice-based design research and design practice is that practice-based research is not 'confined to choosing a form for the knowledge thereby produced; they correspond to a unique kind of knowledge, one that is distinct from other academic disciplines' (Nova, 2020: 12). Cross defines the way of generating new knowledge through practice as *designerly ways of knowing* (Cross, 2007: 12). Stephens (2018) states that 'the critical difference is that practice-based research aims to generate culturally novel apprehensions that are not just novel to the creator or individual observers of an artefact' (Stephens, 2008: 8).

1.4.2. DESIGNER AS RESEARCHER

To conduct the investigation, I adopt a dual position as designer and researcher to reflect and use my knowledge in the practice of woven textiles embedded in this academic enquiry. The research uses the term designer-researcher to reflect this dual position. During the development of the practice, I have collaborated with a computer engineer and TextielLab[2]. Through the collaborations I have elaborated a cross-disciplinary technical vocabulary, between weaving and coding, to communicate and share my ideas with both parties. The communication has occurred via e-mails, in-person meetings and online video calls. In both scenarios, I have used technical words of each discipline to avoid confusing terms that would hinder the discussion. Although I have used different levels of communication and terms during the collaborations, one aspect that both collaborations shared is the use of visual graphics to illustrate the practice's aim.

Nova (2020) points out how some elements of the design process can be applied to design research, citing the use of diagrams as a way to communicate and present information. During the practice work of this research, the use of visual graphics, prototyping, and handling materials are indispensable to reflect in and on the practice (Schön, 1983). The graphical visualisations are used in this research to analyse and present the frameworks during the literature review or to plan the qualitative multi-method triangulation. This thesis presents graphical visualisations to explain the elements of the research, which has been beneficial for

[2] TextielLab is part of the TextielMuseum in Tilburg (the Netherlands). It offers students and makers the opportunity to use commercial textile technology to produce textiles.

me in the reflections of findings as well as a tool for communicating them. They can be seen as a fundamental part of the thesis, presenting the layering of theory as well as practice and foregrounding the research through the lens of the designer-researcher.

1.4.3. PRACTICE OF WEAVING

This research revolves around the practice of weaving by elaborating textile samples, creating digital patterns and weaving Jacquard co-designed textile samples (Figure 1.5). The practice uses ScotWeave Jacquard Designer (ScotCad, 2016), a software to digitally design woven textiles and translate digital images into Jacquard textiles. The software aids the visualisation of the patterns and weave structures, and shows possible errors before being tested on the loom. The digitalisation of the process helps to reduce the time of weaving Jacquard textiles (Stephens, 2018).

During the initial phase of the practice, where 12 woven textile samples are required, I have used a 16-shaft dobby loom[3] as it provides an easier and faster way of making the textiles than the TC-1 loom[4]. During the Stage Three of the practice, I have used the TC-1 loom to test the yarns' behaviour[5] with the weave structures and see whether future changes were required, such as modifying the selvedges density or weave structures when two yarns

[3] A loom where device called a dobby controls the warp threads divided in 16 shafts.
[4] TC-1 loom (Tronud Engineering, 1995) is a digital Jacquard handloom, which allows the weaver to control every single thread independently using a computer connected directly to the loom.
[5] Yarn behaviour refers to the interaction of the yarn with different elements of the weave such as warp and weft densities, thickness, and weave structure.

behave differently. Using the TC-1 loom, I have developed part of the practice by creating textile samples to be tested by participants. Once the design elements of the final co-designed woven textile were concluded, TextielLab became involved in the making. They have a computer-controlled Dornier Jacquard rapier loom that allows a digital pattern to be woven. I provided them with the digital documents and with the specifications of yarns, weave structures, pattern and size. The co-designed digital Jacquard woven textiles were woven through a first initial test to ensure the conversion of TC-1 loom to Dornier Jacquard rapier loom. The process of using the TC-1 loom to produce textile prototypes before industrial production has been adopted by weaving studios such as Wallace Sewell (Wallace & Sewell, 1992).

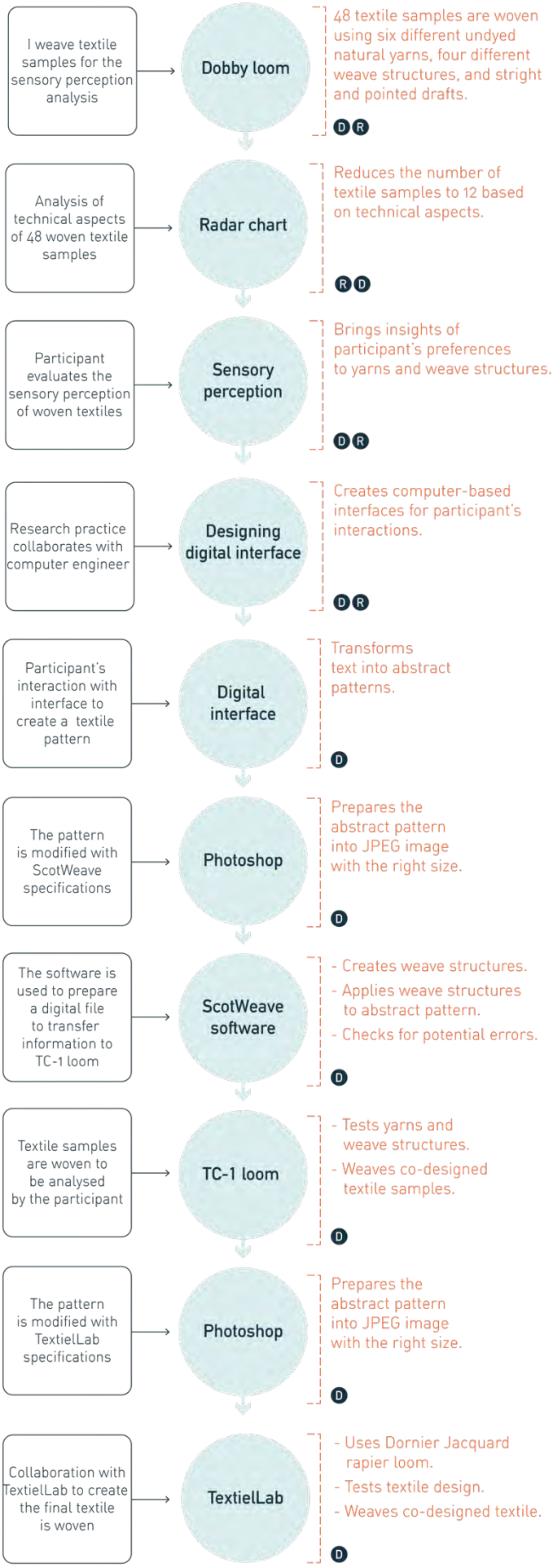


Figure 1. 5. The process of weaving in this research practice.

1.5. THESIS STRUCTURE

This introduction chapter has introduced the aim of the investigation and presented the research rationale; this section outlines the remaining chapters. Figure 1.6 illustrates the structure of the thesis based on the foundation, exploration and implication phases.

Figure 1. 6. Research thesis structure.

While Chapter One has introduced the research rationale, Chapter Two provides literature on Emotional Experience, digital coding within the textile practice and co-design to establish the contemporary debates of the research's subject and identify gaps in knowledge. Chapter Three explains and justifies the methods, methodology and validity of the research. The chapter reflects on the importance of tacit knowledge while conducting the practice as an element of research and the approach taken to capture and translate it into explicit knowledge. Chapter Four documents the practice elements of this research. It provides a description of the three stages of the practice to co-design digital Jacquard woven textiles to elicit Emotional Experience. Chapter Five presents the practice analysis and associates the findings to the literature review and the research framework. It outlines specific examples of the three stages of the practice to illustrate the concepts discussed. Finally, the research conclusions are presented in Chapter Six, providing a discussion of the main findings and reviewing the outcomes concerning the set research question and objectives in Chapter One. It presents the contribution to knowledge as well as the research limitations. The chapter identifies opportunities in the industry, other design fields, and further research.

2. LITERATURE REVIEW

This literature review covers three key areas within which this research is situated: Emotional Experience, digital coding within textile practice, and co-design process. To establish a contextual framework for this research, this chapter is structured into the following sections:

- *Emotional Experience*: presents contemporary debates about the emotional bond between objects and individuals, looking at consumer behaviour, design, and textile areas, and establishing a framework for this research. It informs a method for the practical inquiry by introducing and evaluating means of analysis of participants' emotional responses towards woven textiles.
- *Digital coding*: explains the connections between digital coding and textiles, and presenting a contextual review of current textile projects that have introduced digital coding into their practice. The review of digital coding within textile projects identifies three categories which guide the practice.
- *Co-design process*: looks at the current debates of co-design processes and human behaviour fields, this section establishes a computer-led co-design experience method to implement digital coding within weaving practice to elicit Emotional Experience.

2.1. EMOTIONAL EXPERIENCE

This section presents theoretical notions of Emotional Experience. It analyses, compares, and explains different approaches delimited to inform and guide the practice-based research. The section consists of three areas of research looking at Emotional Experience. First, Emotional Experience is presented from the individual's experience through consumer behaviour (section 2.1.1); second, it is introduced from the designer's perspective by looking at design literature (section 2.2); finally, literature on Emotional Experience within textiles is presented as informing the practice of this research (section 2.1.3). The aim is to provide a framework that helps to identify and categorise elements of woven textiles that stimulate emotionally significant associations, and asks how to implement them via a computer-led co-design experience to elicit Emotional Experience.

2.1.1. EMOTIONAL EXPERIENCE IN CONSUMER BEHAVIOUR

The relationship between individuals and objects has gained relevance as an area in the past forty years within consumer behaviour literature. Schifferstein & Pelegrim (2008) examine and define the construct of *Consumer-product Attachment*. According to them, *Consumer-product Attachment* refers to:

> …the strength of the emotional bond a consumer experiences with a durable product. Consumer-product attachment implies the existence of an emotional tie between a person and an object. An object to which a person is attached is considered to be special and typically means a lot to that person (Schifferstein & Pelegrim, 2008: 1).

Schifferstein & Pelegrim (2008) create speculative determinants to analyse the *Consumer-product Attachment* based on Greenwald's (1988) *Four-facets of a Person's Self-schema*. The four facets presented by Greenwald are *Diffuse Self*, *Private Self, Public Self* and *Collective Self*. As seen in Figure 2.1, *Diffuse Self* refers to hedonic satisfaction, its roots are in sensory perception, innate pleasure, and pain responses. The *Private Self* is connected to the individual achievement, trying to meet internal and personal standards. The aim of the *Public Self* is the approval from others, family members and friends. Finally, the *Collective Self* refers to the approval from a reference group such as country or religion. According to this schema, if an individual's experience elicits an attachment to objects because they help to reassure their self and enhance individual's feelings, then the *Four-facets of Person's Self-schema* can help to indicate the variables that influence the degree of attachment between an object and a person.

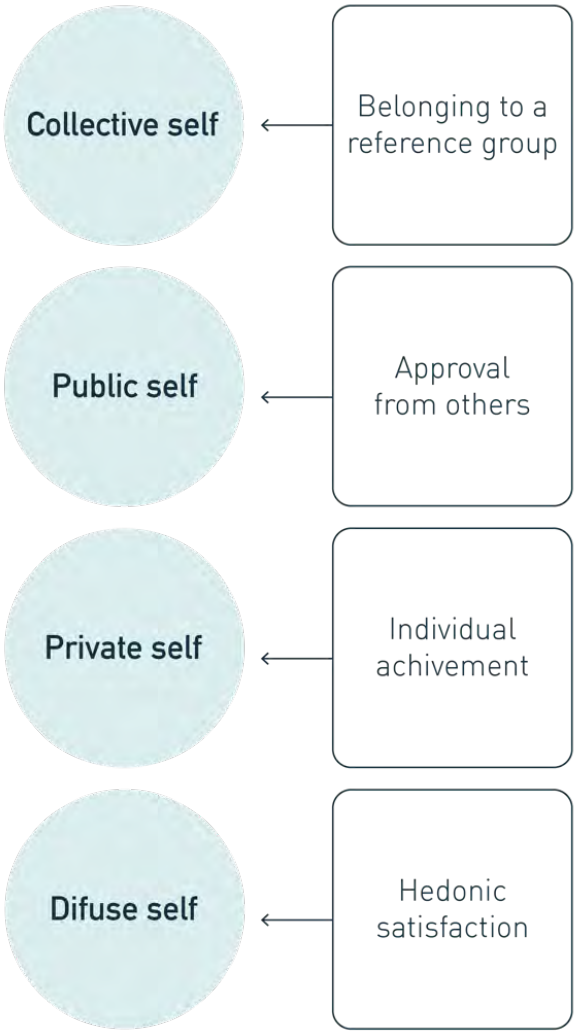


Figure 2. 1. Interpretation of Greenwald's (1998) Four-facets of a Person Self-schema.

Based on Greemwald's (1998) *Four-facets of a Person Self-schema,* Schifferstein & Pelegrim (2008) present the following four speculative determinants. Sensory and aesthetic domains of the object promote an *Enjoyment* that reflects on the *Diffuse Self*. Objects that represent the *Individual Autonomy* respond to the needs of *Private Self*. The reaffirmation of *Group Affiliation* promotes the *Public Self*, such as school uniform. Finally, a *Life vision* object reflects the *Collective Self*. They also add two more determinants to analyse that do not correlate to

the *Four-facets of the Person's Self-schema*, *Product Utility* and *Market Value*. While *Product Utility* refers to the usefulness of the object, durability and reliability, *Market Value* may be used for a status symbol. Both *Product Utility* and *Market Value* are not seen as a direct influence of attachment, but rather two determinants that complement attachment (Figure 2.2).

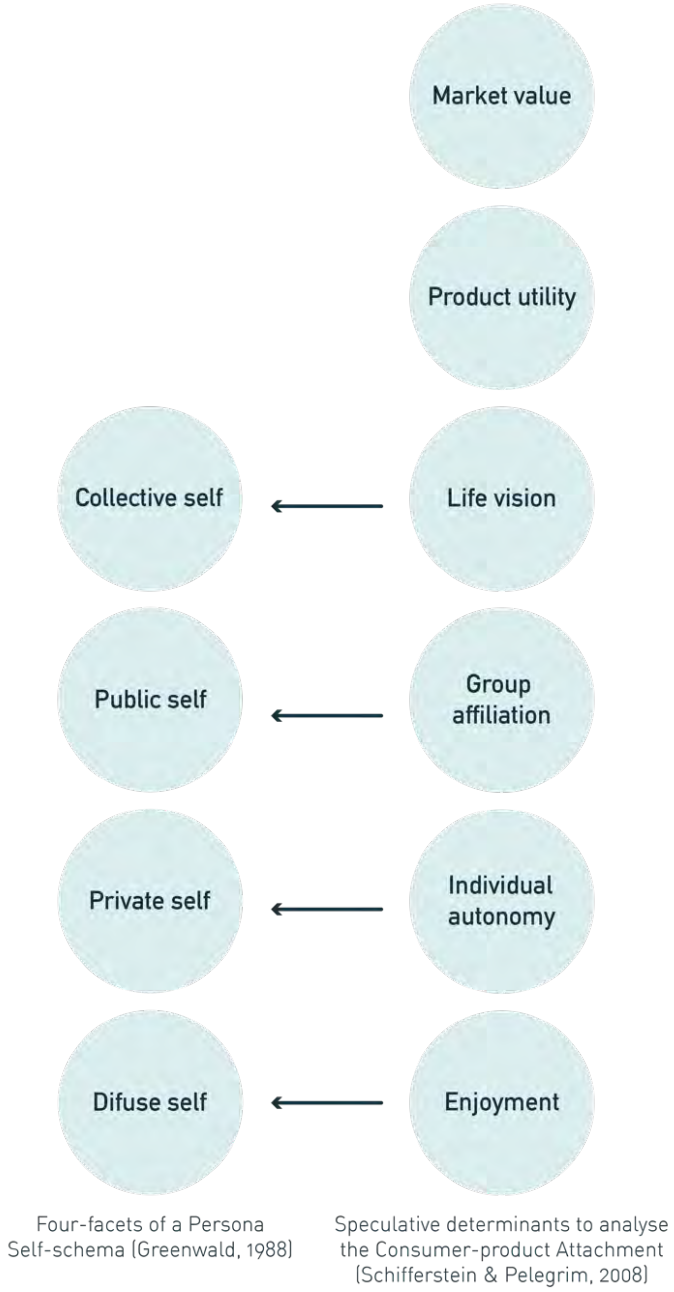


Figure 2. 2. Interpretation of the correlation between Four-facets of a Persona Self-schema (Greenwald, 1988) and the speculative determinants to analyse Consumer-product Attachment (Schifferstein & Pelgrim, 2008).

The results from Schifferstein & Pelegrim's (2008) research partially support their speculative determinants, making several adaptations to their initial structure. They distinguish two determinants that contribute positively to the degree of attachment: *Enjoyment* and *Memories of person, places and events*. *Enjoyment* is highly valued during the initial period of ownership, and *Memories of person, places and events* is more valued in older objects. They suggest different techniques to introduce both determinants into the design process. On the one hand, *Enjoyment* contains sensory pleasure occurring during use, whilst experiencing aesthetic pleasure and the growing familiarity of the product. Hence, designing products that promote sensory and aesthetic pleasure can evoke *Enjoyment*. According to them, another technique to consider when designing products for *Enjoyment* is the surprise factor[6]. On the other hand, Schifferstein & Pelegrim's (2008) outcomes suggest that the accumulation of *Memories of person, places and events* is the most promising for increasing attachment in the long term, however they point out that this factor can be out of the control of the designer due to the subjectivity of this factor. They also suggest designing products for gift-giving in order to create *Memories of person, places and events*. Based on their *Consumer-product Attachment*'s determinants, this research creates textiles using sensory perception as a design element and therefore reflects indirectly to the *Enjoyment* determinant; and provides a participatory design to promote experiences and indirectly responds to the *Memories of person, places and events*' determinant.

[6] Refers to an unexpected aspect of the product (Schifferstein & Pelegrim 2008).

2.1.2. EMOTIONAL EXPERIENCE IN DESIGN

The design community has introduced elements from other research disciplines to elaborate frameworks to relate the emotional tie between objects and individuals. For instance, Schifferstein & Pelegrim (2008) connect Greenwald's (1988) *Four-facets of a Person's Self-schema* to Norman's (2004) study of *Three Levels of Design Theory* and Jordan's (2003) study of *Pleasure-based Approach* to further elaborate *Consumer-product Attachment* concepts. This section introduces three frameworks that conceptualise the connections between design and Emotional Experience in order to conceptualise a tool to elicit an emotional bond with digital Jacquard woven textiles.

From a design perspective, Donald Norman (2004), a cognitive, computer and user experience researcher, presents work on *Emotional Design*. He distinguishes three aspects of design that relate to the three levels of human cognitive and emotional system of processing information, acknowledging the oversimplification of it (Herd, 2012). Norman (2004) states that at the *Visceral Level*, individuals have the same reactions all over the world; individuals perform in the same automatic manner when feeling pleasure or fear, yet the *Behavioural* and *Reflective Level* are sensitive to experiences, training, education and the person's background. The *Behavioural Level* controls the everyday behaviour and actions of the individual, how the person reacts in stressful situations or in enjoyable moments. The contemplative part of the brain is linked to the *Reflective Level* (Figure 2.3).

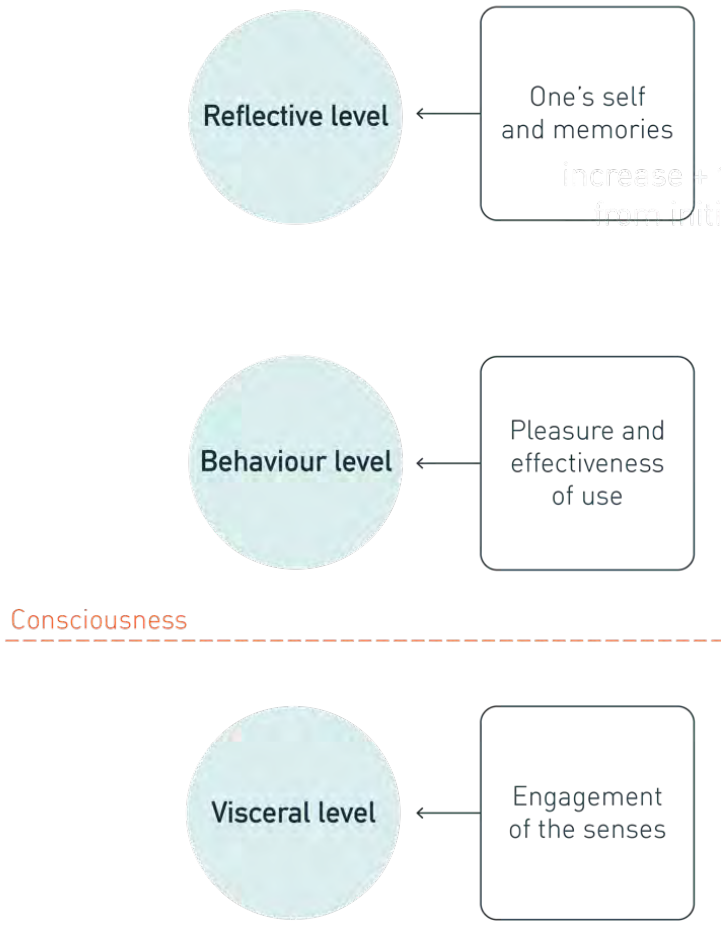


Figure 2. 3. Interpretation of the Three Levels of the Brain (Norman, 2004).

When associating Norman's Three Levels of the Brain (2004) to Greendwald's (1988) work, there are similarities between their factors (Figure 2.4). Both recognise a level of hedonic reaction related to body feedback, and a level of reflective self that relates to the individual's performance and achievements. Finally, there is a level of interaction and behaviour in a group, where Norman's recognises as one level, *Behavioural Level*, and Greendwald presents two distinctions, the *Public Self* and *the Collective Self*.

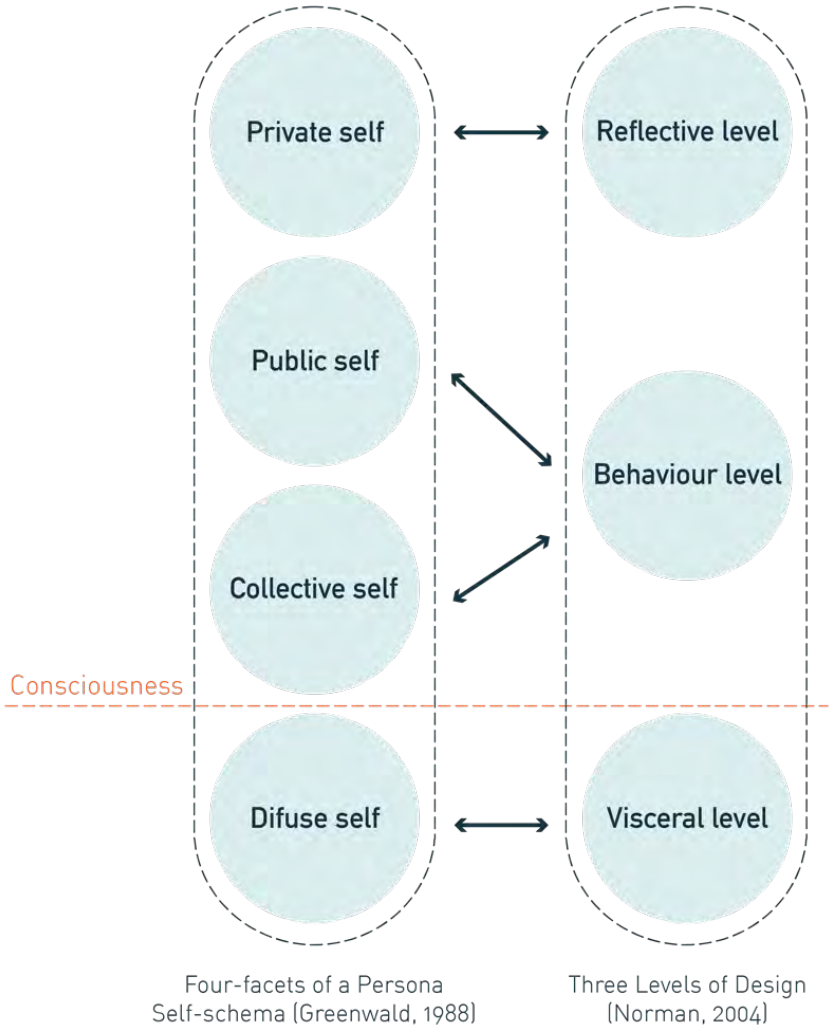


Figure 2. 4. Comparison of Greenwald's (1988) Four-facets of a Persona Self-schema to Norman's (2004) Three Levels of Design.

Norman relates the three levels to the design field. *Visceral Design* concerns the appearance of the object. This design is related to nature as humans coexist in the environment with other humans, animals, plants and so on. As a consequence of this coexisting nature, individuals are open to receive powerful emotional signals from the environment that are transmitted automatically at a *Visceral Level*. The basic principles of *Visceral Design* consist of engaging the person's senses, such as touch or sound, as the dominant aspects of the design.

Behavioural Design is related to pleasure and effectiveness of use. *Behavioural Design* is all about performance, where appearance and rationale are not important. The four components of good *Behavioural Design* that matter are function, understandability, usability and physical sensation. While *Visceral* and *Behavioural Design* relate to appearance and use, *Reflective Design* covers a huge territory. It considers the intellectualisation of the object, oneself and memories. For one individual, it is about the meaning and the personal remembrance an object evokes; for another, it is about the projection of their self-image and the message an object sends to society. Activities starting from a *Visceral Level*, the lowest level, are called *bottom-up*; however, the activities which are initiated from the highest level, reflective, are *top-down.* Norman's *Three Levels of Design Theory* can be associated with Jordan's (2003) notion of *Pleasure-based Approach* to human factors and the *Three-level Product Experience Framework* by Desmet & Hekkert (2007).

Jordan (2003), a marketing, design and brand strategy consultant, defines pleasure with products as '…the emotional, hedonic and practical benefits associated with products' (Jordan, 2003: 11); understanding emotional benefits as those belonging to how products affect a person's mood. 'The hedonic benefits are those belonging to the sensory and aesthetic pleasures associated with products' (Jordan, 2003: 11). It is important to note that pleasure with products builds up from the relationship between the individual and the object. Jordan's pleasure framework is based on the work of Tiger (1992), an anthropologist who identified the four pleasures of the human condition.

Figure 2.5 shows the levels of *Pleasure-based Approach*, where Jordan (2003) distinguishes the following categories: *Physio-pleasure, Socio-pleasure, Psycho-pleasure* and *Ideo-pleasure*.

The *Physio-pleasure* is concerned with the physical body from anthropometrics and ergonomics to the sensory perception's positive feedback of the object. *Socio-pleasure* is drawn from aspects of the object that represents social status and helps to construct a personal identity into a desirable social group. *Psycho-pleasure* refers to the individual's cognitive interaction with an object and their subsequent emotional reaction. *Ideo-pleasure* relates to individual's values such as the political and religious.

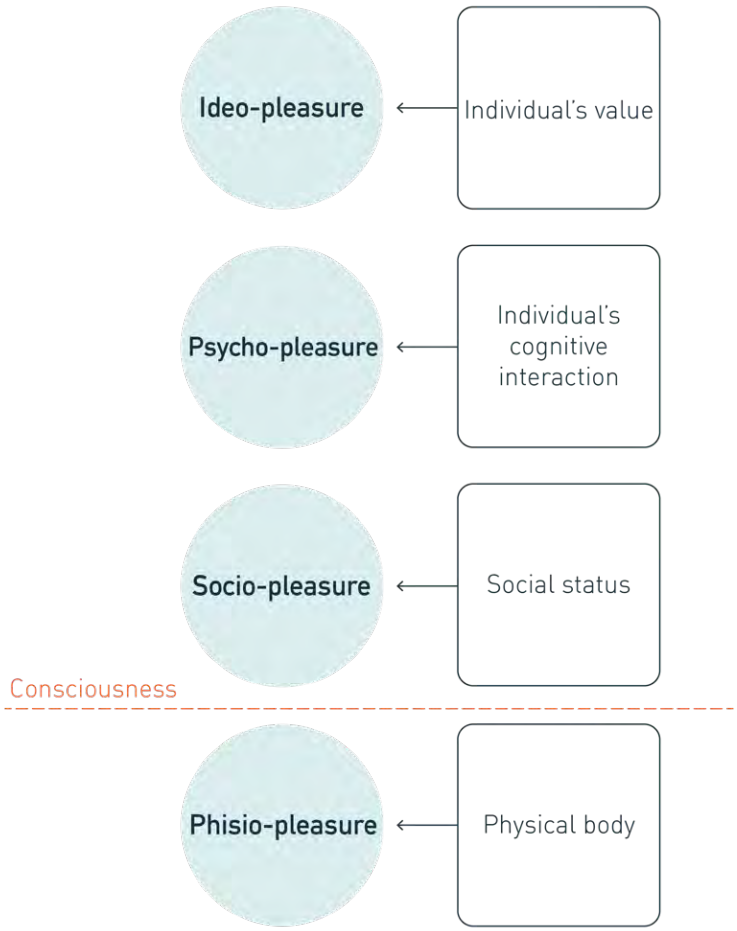


Figure 2. 5. Interpretation of Jordan's (2002) pleasure-based approach.

For Norman (2004), *Physio-pleasure* combines aspects of *Visceral Design* with some from *Behavioural Design. Socio-pleasure* derives from interaction with others, and combines elements of both *Behavioural* and *Reflective Designs*. The pleasure that acts upon peoples' reactions and psychological state during the use of a product is *Psycho-pleasure*, which resides at a *Behavioural Level*. Finally, *Ideo-pleasure*, where the value of objects come from and the statement they make, clearly lies within *Reflective Design* (Figure 2.6).

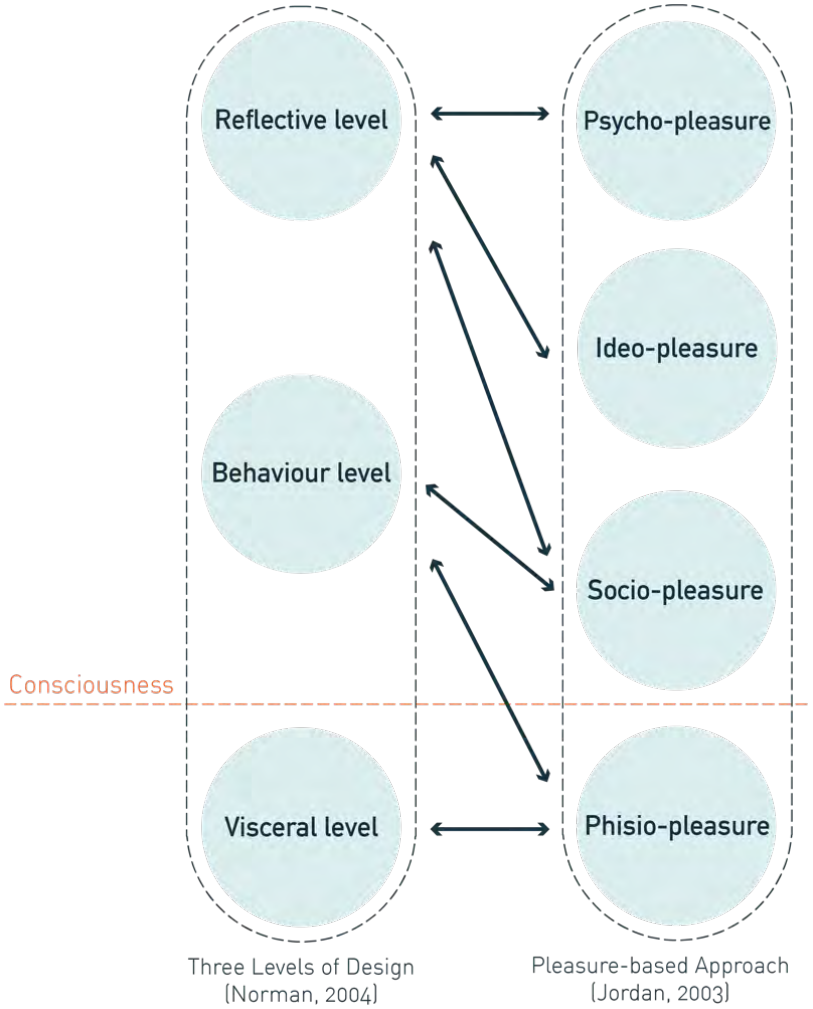


Figure 2. 6. Interpretation of the connections of Jordan's (2002) Pleasure-based Approach and Norman's (2004) Three Level of Design.

Figure 2.7 presents the connections between Greenwald's (1988), Jordan's (2003) and Norman's (2004) frameworks, where the three frames agree on a level of a sensory perception's positive feedback of the object, and a level of individual's cognitive interaction and reflection. The middle level refers to the belonging of a group or collective.

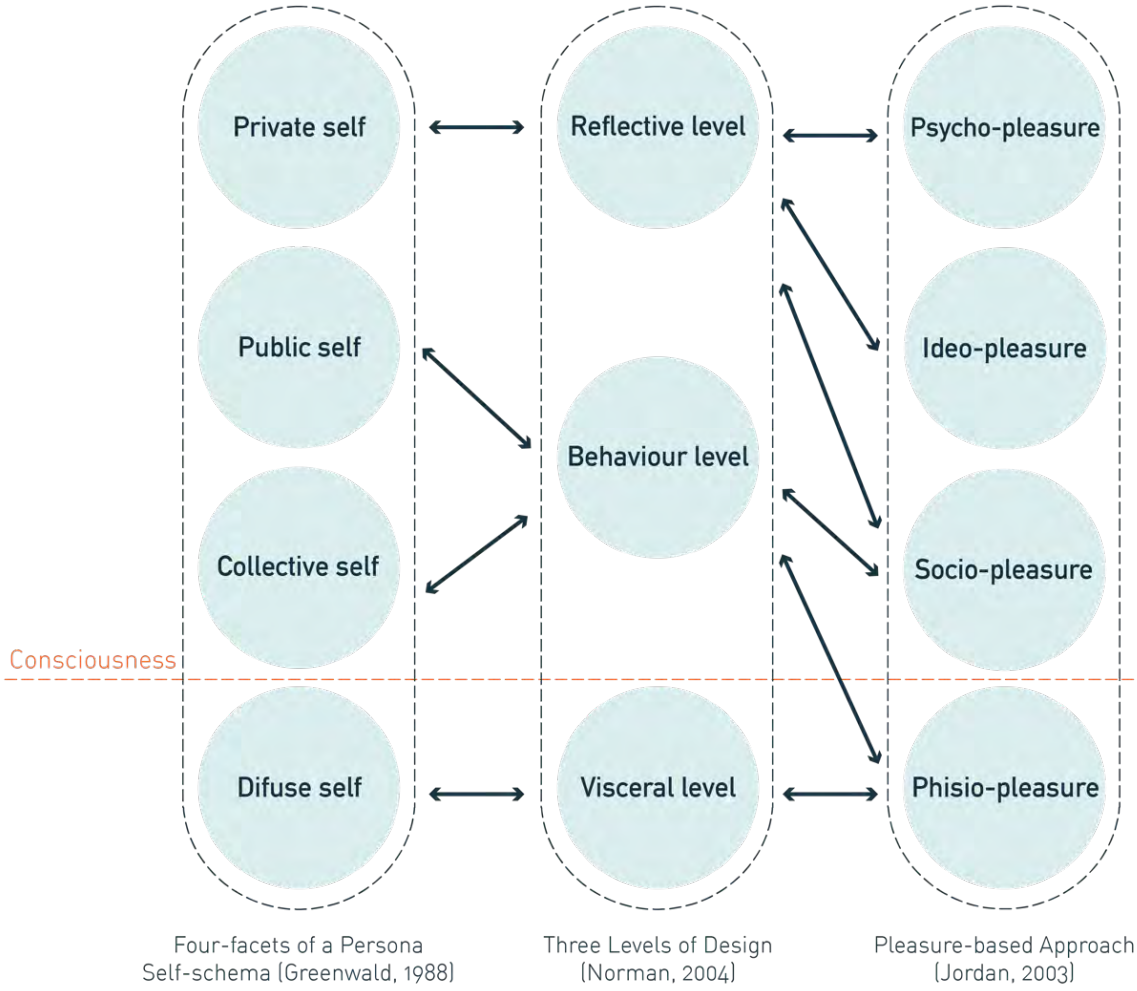


Figure 2. 7. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004) and Pleasure-based Approach (Jordan, 2003).

Desmet & Hekkert (2007) distinguish a *Three-level Product Experience Framework* based on *Aesthetic Experience, Experience of Meaning* and *Emotional Experience* (Figure 2.8). They refer to *Product Experience* as the whole set of affects aroused by the interaction between a person and an object, '…including the degree to which all our senses are gratified (aesthetic experience), the meanings we attach to the product (experience of meaning) and the feelings and emotions that are elicited (emotional experience)' (Desmet & Hekkert, 2007: 59). These three levels have their own processes, the *Aesthetic Experience* level can delight one or more of a person's sensory modalities, for example, sound and smell. They point out that this level has a specific focus on the tactile and kinaesthetic, rather than on the visual aesthetics. At the *Experience of Meaning* level, cognition plays an important role assessing personal and symbolic significance of the object. The cognitive process in this level is subjective to the individual's background. Finally, the *Emotional Experience* level refers to those that evoke an emotional reaction, those affective phenomena typically considered in emotion psychology.

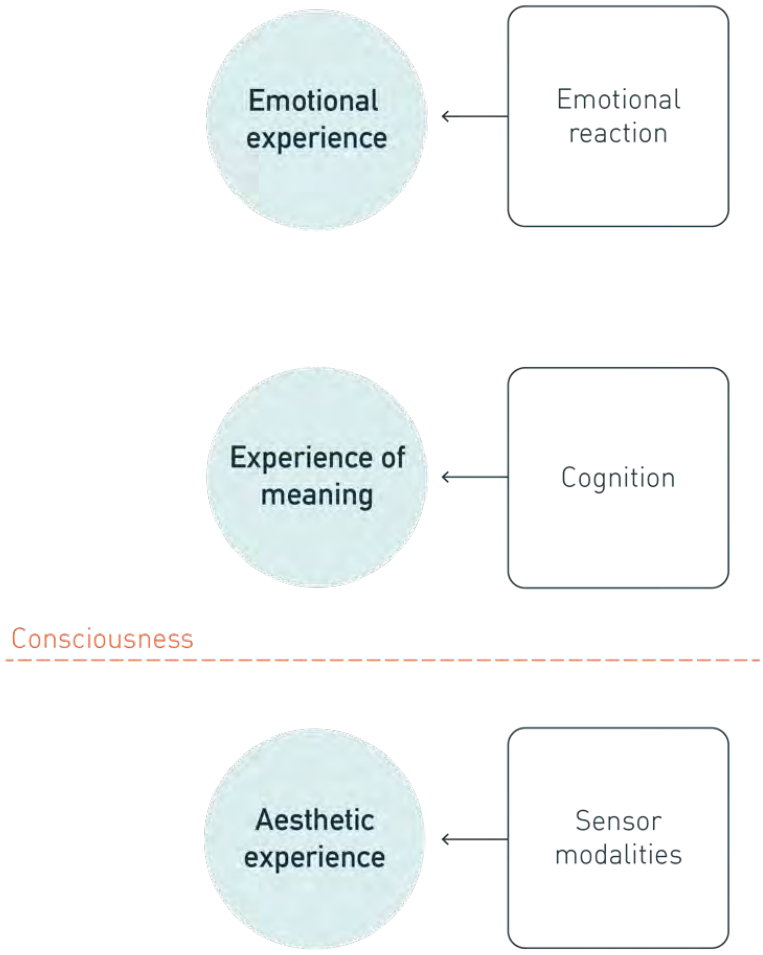


Figure 2. 8. Interpretation of the Desmet & Hekkert's (2007) Three-level of Product Experience.

Desmet & Hekkert's *Three-level Product Experience Framework* can be related to the three frameworks discussed previously. It is important to note that these four frameworks – *Four-facets of a Persona Self-Schema* (Greenwald, 1988), *Pleasure-based Approach* (Jordan, 2003), *Three Levels of Design* (Norman, 2004) and *Three-level of Product Experience* (Desmet & Hekkert, 2007) – are correlated and have some agreements and discrepancies. In all four frameworks, the first and more basic level involves direct sensory gratification, where the top level involves higher level of cognitive elaboration linked to an emotional reaction. According to Schifferstein & Pelegrim (2008), in the intermediate level *Socio-pleasure* can be associated

to the *Reflective Design* process. On the contrary, this study argues that *Socio-pleasure* is not only associated to the *Reflective Design* but also to *Behavioural Design* as Norman (2004) mentions. Drawing on Desmet & Hekkert (2007), they point out that at the *Experience of Meaning* level, objects can play a class status, hence it exists a direct correlation to *Socio-pleasure*. The main discrepancies between frameworks seems to occur at the remaining levels. Norman's broad definition of *Behaviour* and *Reflective Levels* creates difficulties at the time to associate them to other frameworks. While *Behavioural Design* is related to pleasure and effectiveness of use, *Psycho-pleasure* drives from products' cognitive demands. Although these areas partly overlap, *Psycho-pleasure* may involve complex cognitive elaboration that may not be part of *Behavioural Design*. As shown in Figure 2.9, Greendwald's (1988) *Four-facets of a Person's Self-schema* can be associated to Jordan's (2003), Norman's (2004), and Desmet & Hekkert's (2007) frameworks. These emotional design frameworks share a communality of three main domains: sensorial, consciousness and emotional. It informs the research to create a design process during the making of woven textiles, which then presents spaces for sensorial perception, cognitive effort, and emotional connections.

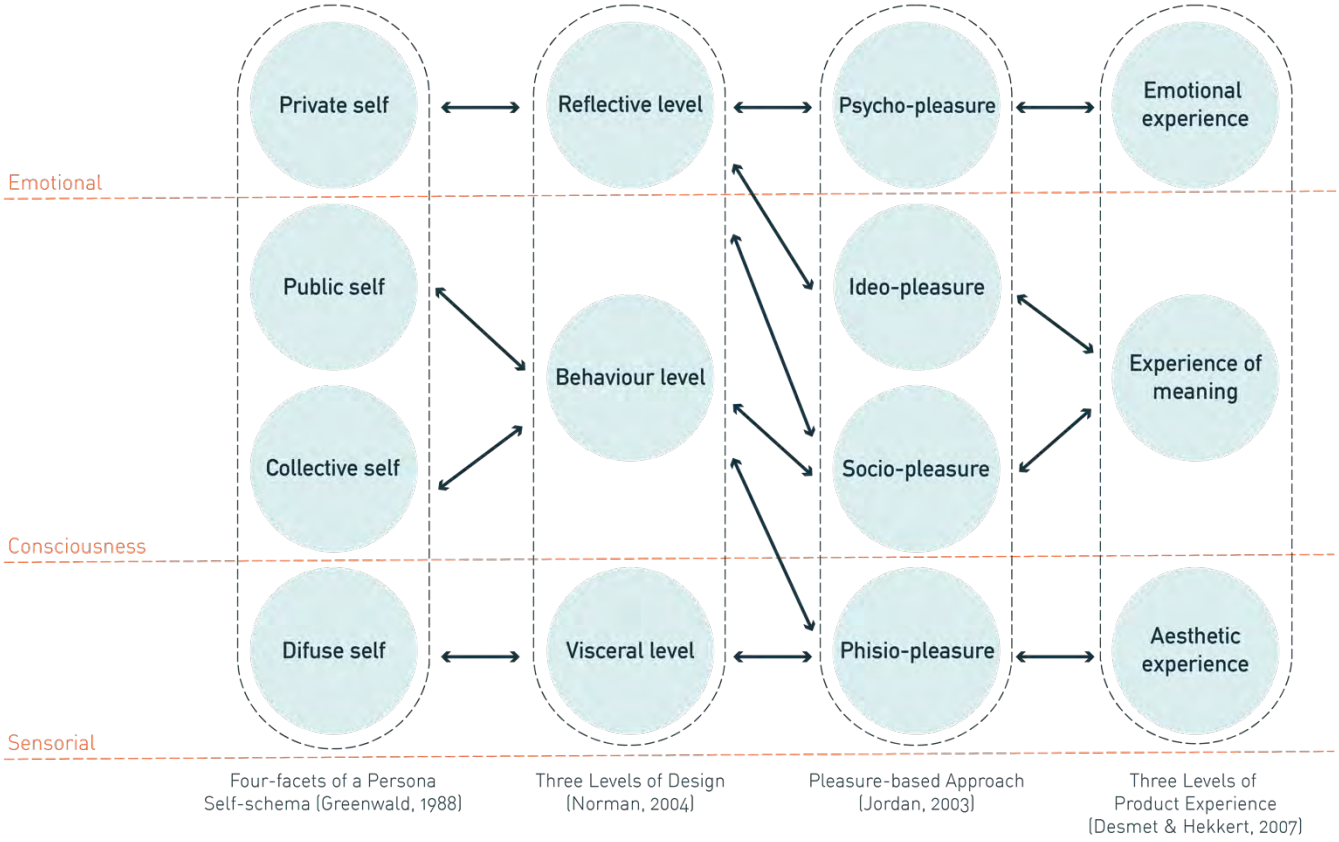


Figure 2. 9. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004), Pleasure-based Approach (Jordan, 2003) and Three-level of Product Experience (Desmet & Hekkert, 2007).

Alaniz & Biazzo (2019) present the development of a methodology to support product design teams in creating new product ideas that are emotion-focused. In their research, they point out that a product can perform an *emotional job* through a diversity of situations. *Emotional job* refers to the clarification of what emotional effect a product should create. These situations, where a product elicits an emotional reaction, are named *Human-product Emotional Interactions* and divided in three categories. The first category is called *Aesthetic interactions* and relates to the physical perception of a product. The second category is

Behavioural interactions, referring to the dynamic interaction between an individual and a product. Finally, *Symbolic interactions* is connected to the set of believes and values the individual assigns to the product or brand. Like Norman (2004) and Desmet & Hekkert (2007), Alaniz & Biazzo (2019) distinguish three levels on which a product can elicit an emotional reaction, based on appearance (Visceral / Aesthetic Experience), performance (Behaviour / Experience of Meaning) and symbolic meaning (Reflective / Emotional Experience) (Figure 2.10).

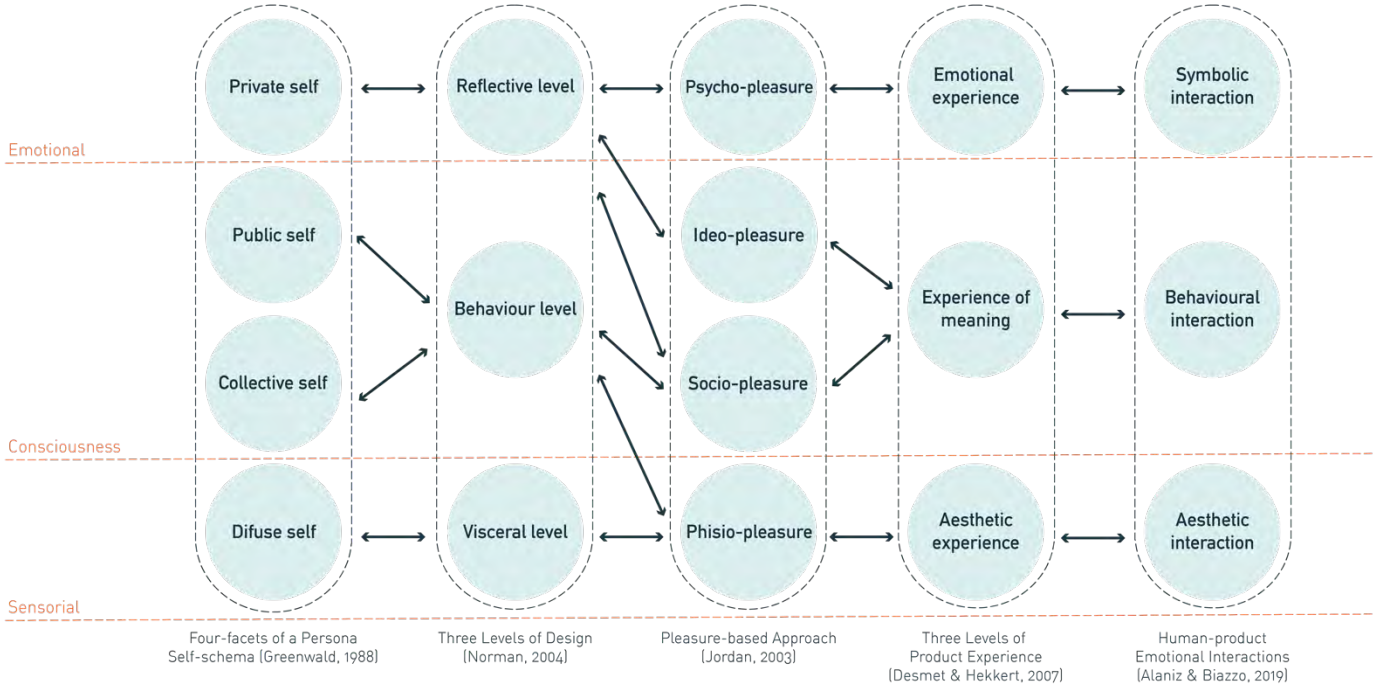


Figure 2. 10. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004), Pleasure-based Approach (Jordan, 2003), Three-level of Product Experience (Desmet & Hekkert, 2007) and Human-product Emotional Interactions (Alaniz & Biazzo, 2019).

The Human-product Emotional Interactions concept is then used by Andreoletti et al. (2022) to propose a methodological framework for implementing emotion-driven design. The framework is based on the iteration of emotion elicitation and recognition through the aid of

virtual reality (VR). They distinguish two modules for VR application within emotion-driven design: Emotion Elicitation Module and Emotion Recognition Module. Emotion Elicitation Module aims to evoke a specific emotion by using the VR, while Emotion Recognition Module's objective is to recognise different emotions. This dual use of the VR, elicitation and recognition, reflects this research's practice of designing with Emotional Experience; where one part of the practice looks at the embedded Emotional Experience, and the other at the elicited Emotional Experience.

2.1.3. EMOTIONAL EXPERIENCE IN TEXTILES

Although there is a wealth of literature exploring the intimate proximity of clothes to the body and the self, there is little research exploring the specific relationship between woven textiles and emotional connections. This section presents studies that have explored and understood emotional aspects of textiles in different perspectives providing agreements and discrepancies, as well as informing the development of this design practice to promote an elicitation of an emotional tie between the individual and the woven textile.

2.1.4.1. APPLIED TEXTILES

Design researcher Anne Louise Bang examines and explores *Emotional Value of Applied Textiles* in her doctoral thesis *Emotional Value of Applied Textiles - Dialogue-oriented and participatory approaches to textile design* (2010). Bang (2010) also looks at the work of Norman (2004) and Jordan (2003), with the addition of Desmet's (2002; 2008) research in order to study *Emotional Value* within product design. She also presents Homlong's (2006) (section 2.1.4.2) and Moody's et al. (2001) (section 3.2.3.1.1) studies to further detail her investigation.

During his time as a design researcher, Peter Desment has developed a model of using different tools for analysis; informing how the designer should address emotional aspects of product design. Desmet's tools are built on cognitive appraisal theories, where the product is seen as the stimulus during the evaluative process. The importance of the perceived stimulus is determined by the individual's concern, which are key points of reference for the appraisal, being a precondition for eliciting an emotion (Desmet, 2008).

Bang (2010) embraces emotion theory from the psychological and philosophical literatures to construct the term *Emotional Value*. She studies the work of the psychologist and philosopher William James (1884)[7] and the neo-Jamesian emotion theories[8], such as the

[7] William James set the foundation of modern emotion theory.
[8] The somatic neo-Jamesian theories are emotion theories that combine bodily feedback with cognitive aspects. Theories that have revived and develop on William James' emotion theory (Bang, 2010).

neuroscientist Antonio Damasio (2000)[9], the philosopher Jesse Prinz (2004)[10], and the researcher in psychology Agnes Moors (2009)[11]. Based on somatic neo-Jamesian emotion theories and conversations with key employees at Gabriel A/S[12], she points out that *Emotional Value* is the emotion causation as a result of body feedback with the combination of cognitive aspects. She argues that Jordan's *Pleasure-based Approach* can function as a common platform for establishing, substantiating and exploring *Emotional Value of Applied Textiles*. According to Bang (2010), this concept agrees with Damasio (2000) and Prinz (2004), when they understand that an emotion that is felt – emotional experience – is literally the emotion; they add to this by saying that pleasure is strongly connected to the emotional experience, although it is not 'an emotion' per se. As this research does not intend to design with emotions, and instead promote an emotional bond with a woven textile, it focuses on creating opportunities to promote pleasure and therefore create an Emotional Experience.

[9] Damasio (1994) argues that the term 'feeling' should be used about experiencing the emotional response to change.
[10] For Prinz (2004) emotions are never mere feelings because emotions can occur unconsciously and carry other information than the conscious feeling, but when an emotion is felt this is literally the emotion.
[11] Agnes Moors (2009) presents a review of theories of emotion causation in psychology.
[12] Gabriel A/S is a Danish Company, which designs and produces furniture textiles and 'related products' for manufacturers of furniture.

2.1.4.2. TEXTILES AS MATERIAL

The language of Textiles: Description and Judgement of Textile Pattern Composition by Siri Homlong (2006), an artisan and textile design teacher, investigates emotional aspects of textiles. The purpose of her research is to focus on personal aesthetic experiences and aesthetic judgements of textile pattern composition in the surrounding environment. She states that the notion of aesthetic qualities in her research is based on patterns of colours and shapes due to the fact her research only analyses the visual sense through verbal communication of the participants.

Homlong (2006) argues that aesthetic perception helps to give structure and order to the outside world. In a conscious or unconscious interaction with the surrounding environment the individual acquires dynamic, coherent and significant patterns of perceived experience. These are the basis of implicit knowledge that serve the purpose of perception.

According to Homlong (2006) an individual's visual perception and aesthetic appreciations are affected by emotions. She refers to the types of consciousness and the relation to the three types of the self that Damasio (2000) builds in his book *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* to relate emotions to the surrounding environment. Damasio presents *Three Levels of the Self*: *Proto-Self, Core Self* and

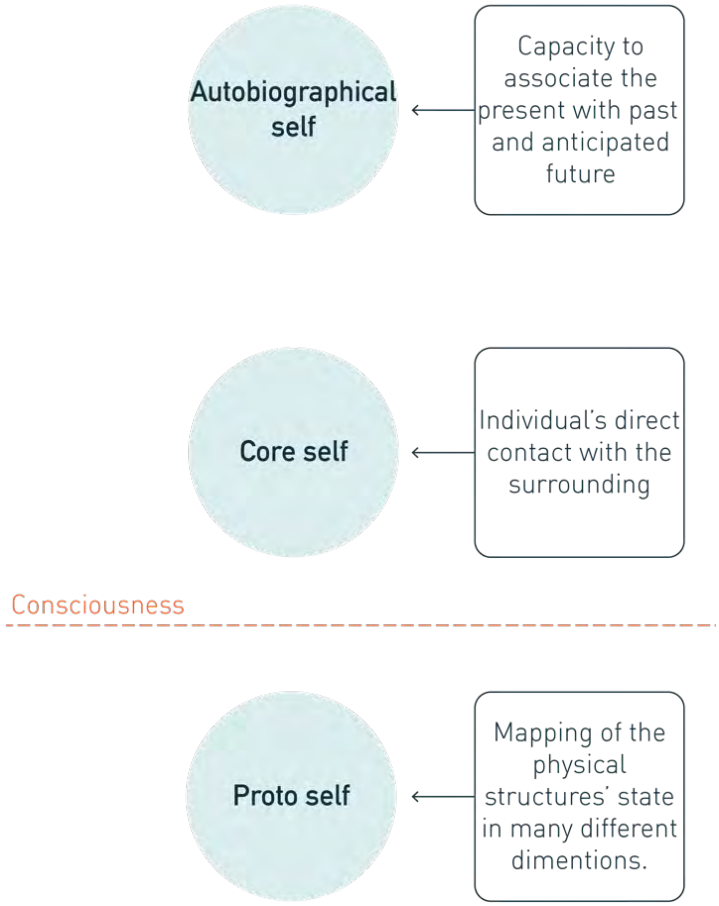


Figure 2. 11. Interpretation of Damasio's (2000) Three Types of the Self related to the types of consciousness.

Autobiographical Self (Figure 2.11). Note that Homlong only uses the conscious levels, *Core Self* and *Autobiographical Self*, to develop her research. She postulates that through the *Autobiographical Self*, the individual gains their own subjective experience and judgement of the surrounding environment. Remarking that each individual appraises the same object or situation in a different way because of their own subjective experience.

Damasio's (2000) theory of the *Three Levels of the Self* is closely related to Greenwald's (1988), Jordan (2003), Norman's (2004) and Desmet & Hekkert's (2007) framework, where they recognise an unconscious level and a top-level sensitive to experience (Figure 2.12.).

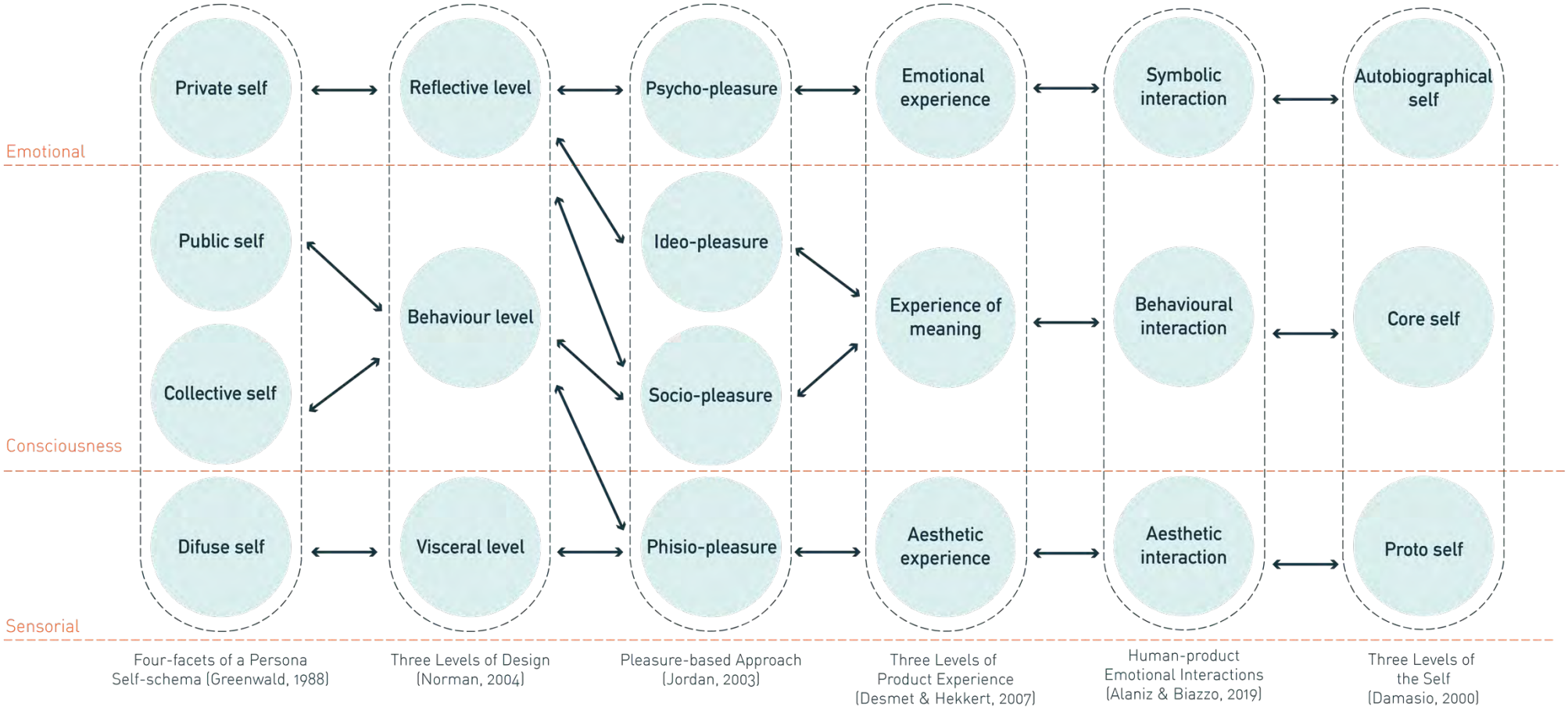


Figure 2. 12. Correlations between Four-facets of a Persona Self-Schema (Greenwald, 1988), Three Levels of Design (Norman, 2004), Pleasure-based Approach (Jordan, 2003), Three Levels of Product Experience (Desmet & Hekkert, 2007), Human-product Emotional Interaction (Alaniz & Biazzo, 2019), and Three Levels of the Self (Damasio, 2000).

While Bang (2010) connects *Emotion Value of Applied Textiles* to Jordan's (2003) and Norman's (2004) work, Homlong (2006) links Buchanan's (1989) and Desmet's (2002) work to individual's visual perception and aesthetic appreciations. According to Homlong (2006), Buchanan (1989) divides design rhetoric into three elements: *Logos*, *Ethos* and *Pathos*. The first element, *Logos*, is the technological reasoning, in which the designer manipulates the processes and material to technically solve a problem. The second element is character or *Ethos*; Buchanan (1989) refers to this element as the representation of the designer in the object, not essentially as they are but rather who they wish to be. The third element refers to argument, emotion or *Pathos*, which connects the physical object to the mind creating a fulfilling experience for the user (Figure 2.13).

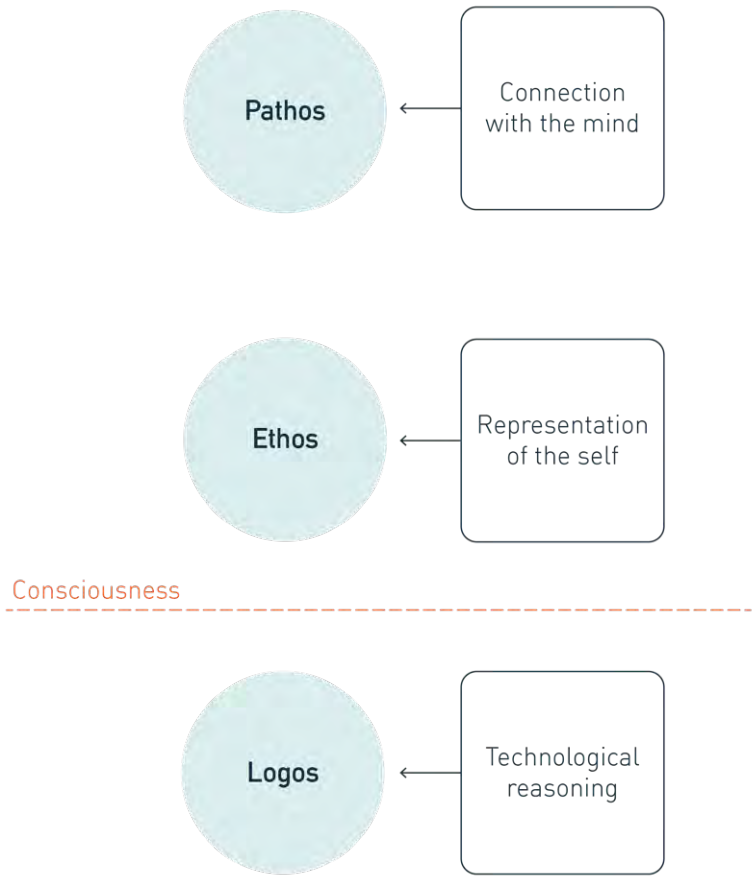


Figure 2. 13. Interpretation of Design Rhetoric framework (Buchanan, 1989)

Figure 2.14 compares Damasio's (2000) theory of *Three Levels of the Self* with Buchanan's (1989) theory of *Three Elements of Design Rhetoric*. Both theories present three levels, composed by essential, subjective, and emotional element or experience.

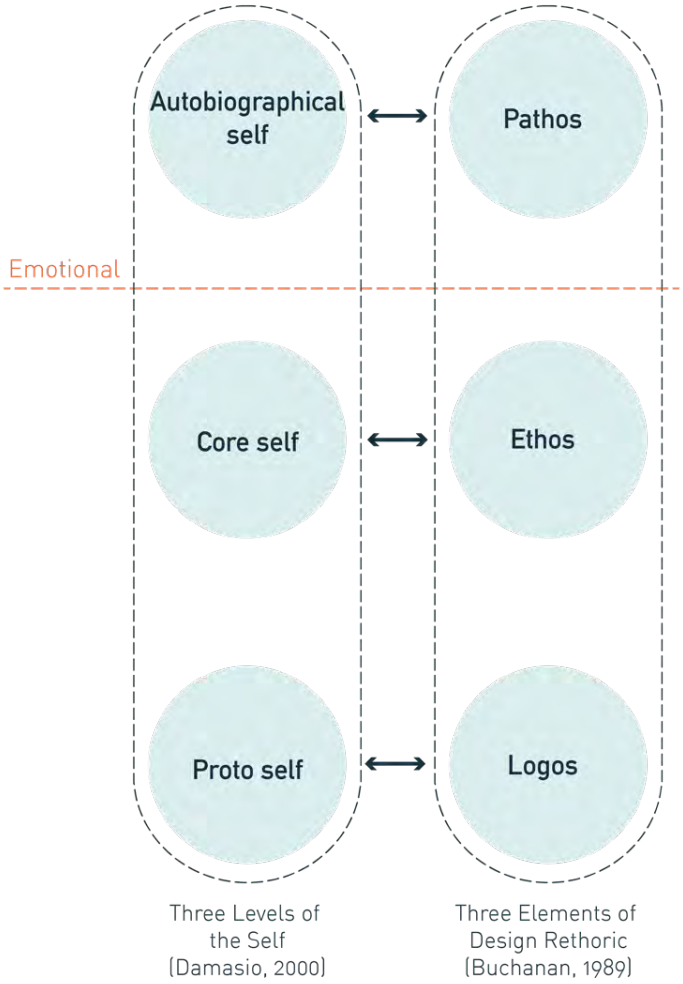


Figure 2. 14. Connection of Damasio's (2000) and Buchanan's (1989) theories.

In perspective of Desmet's (2002) model, Homlong (2006) points out that most of the emotions in his 14 PrEmo[13] were expressed when participants were visually judging the printed textiles. She suggests using Desmet's 14 PrEmo to categorise emotions and mapping emotional concepts to obtain a general view at the end of the study. Homlong (2006) concludes that:

> …awareness of aesthetic qualities is a process of learning through experiences in life. She adds that the dominant inner context of individuals, basic perceptual patterns of apprehension, direct experiences of the surrounding world, and influences from cultural context all give different and complex structures of attention. Different structures of attention lead to different perceptual choices and different descriptions, judgements, notions and values concerning, for example, a designed printed pattern (Homlong, 2006: 78).

This research acknowledges the results, but it also argues that Homlong (2006) only analyses the visual sense excluding relevant senses for textiles such as touch. This research advances Homlong's (2006) study by analysing sensory perception of woven textiles through tactile unimodal analysis, visual unimodal analysis and tactile-visual bimodal analysis (section 4.2.1). It also argues that Desmet's 14 PrEmo does not fulfil the aim of this research as it focuses on designing based on emotions, while this research focuses on the elicitation of an emotional bond during the design phase.

[13] Desmet's computer programme, 14 PrEmo, to guide designers in controlling emotional responses to their design based on 14 basic emotions into five groups.

2.1.4. EMOTIONAL EXPERIENCE THREE-DOMAIN FRAMEWORK

Based on different frameworks and theories related to Emotional Experience presented and evaluated in this section, this research has constructed an *Emotional Experience three-domain framework* (Figure 2.15). Greenwald (1988), Jordan (2003), Norman (2004), Desmet & Hekkert (2007) and Alaniz& Biazzo (2019) all distinguish sensorial, cognitive and emotional aspects of design. The *Three-Domain framework for Emotional Experience* accordingly comprises *Sensory, Cognitive* and *Emotional Domains*. The *Sensory Domain* consists of engaging the sensory perception of the surroundings, e.g. through touch and vision, creating positive bodily feedback. The *Cognitive Domain* is the conscious recognition and satisfaction of an object; this domain is subjective to the individual's background. Finally, *Emotional Domain*, refers to the cognitive elaboration linked to an emotional factor. The research categorises participants' responses towards sensory perception of woven textiles using the Emotional Experience three-domain *framework* to understand which attributes of the textiles arouse sensorial feedback, cognitive recognitions and emotional connections.

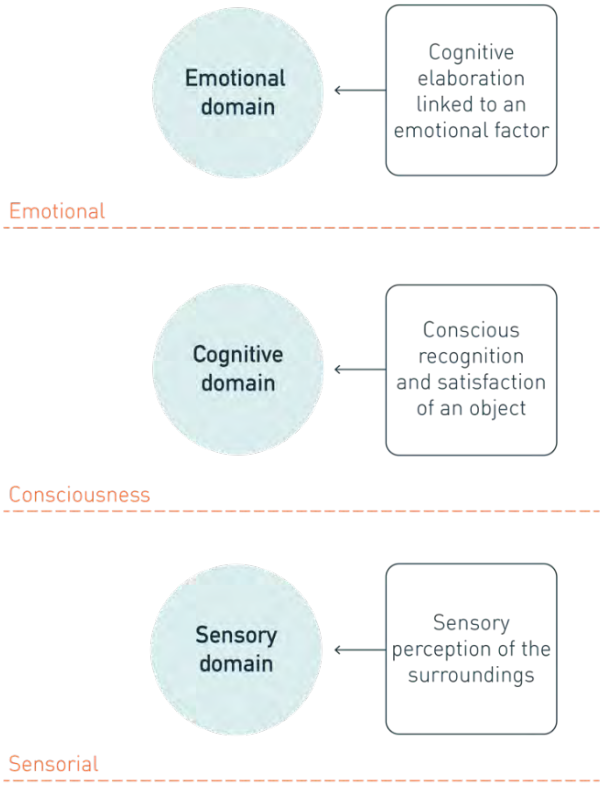


Figure 2. 15. Interpretation of the Emotional Experience three-domain framework.

2.1.5. SUMMARY

The Emotional Experience three-domain framework has been introduced in this research after a discussion of current debates on the emotional connections between individuals and objects. It reflects the intangible bond instilled through the creative process as well as the final outcome, focusing on designing with an awareness of the three domains: sensory,

cognitive, and emotional. It provides a tool for categorisation of participants' responses during the evaluation of woven textiles.

2.2. DIGITAL CODING & TEXTILES

Textile designers have traditionally interrelated, interacted and interchanged craft and technology structures, process and materials. In relation to this in an era of digital technology, textile designers have introduced digital processes into their practice to create new ways of making, aid the practice and reduce the time of production. The practice of this research looks at how to elicit Emotional Experience with Jacquard woven textiles and sees digital coding as a tool for ideation. This section looks at textile theory and practice, focussing on the Jacquard loom and digital coding languages.

2.2.1. FROM THE JACQUARD LOOM TO THE EARLY COMPUTER

Peter Dormer (1997) points out the fluidity of woven textiles to connect and introduce contemporary technology. This fluidity of woven textiles' embracing of latest technologies is cited from as early as the nineteenth century when Ada Lovelace, a British mathematician,

states that Analytical Engine[14] '…weaves algebraical patterns just as the Jacquard loom weaves flowers and leaves' (Harlizius-Klück, 2017: 178).

In 1833 Charles Babbage, a British engineer, began to work on the Difference Engine a machine that could compute arithmetical tables (Plant, 1997). According to Essinger (2004), Babbage's initial idea was to use a revolving drum featuring small, raised studs to input data and operate his machine, however later on he borrowed the idea of punched cards from Jacquard looms to substitute the drums.

By the time he had overcome all the difficulties to design the Difference Engine, he had a bigger idea of a new device, the Analytical Engine. While the Difference Engine could only add or subtract, the vision for the Analytical Engine had some attributes similar to the modern all-purpose computer. According to M. Davis & V. Davis (2005) the intentions of this new device would have the punched card reader as an input, however the punched card not only contained data but also instructions to be executed (the programme). The instructions would call for addition, substation, multiplication and division of the data. It also would have a small internal storage for data. The Analytical Engine would be divided in three separate parts: the machine itself as the hardware, the programme as a software and then the data.

Subrata Dasgupta (2014) explains how Analytical Engine was supposed to work:

> In the Analytical Engine, computation of each distinct mathematical function is determined by an ordered sequence of (arithmetic) operations on the values of variables. These sequences of operation (in present-centered [*sic*] language,

[14] First proposed mechanical computer.

> programs [*sic*]) can be encoded as patterns of holes on punched cards. The machine reads a particular set of punched cards, a different sequence of operations corresponding to a different mathematical computation is performed (Dasgupta, 2014: 21).

Lovelace was fascinated by Babbage's proposed machine. In 1843 she undertook the translation into English of a French article about the Analytical Engine written by the Italian mathematician Luigi Federico Menabrea (M. Davis & V. Davis, 2005; Plant, 1997). She wrote her footnotes to Menabrea's text, which were a compilation of supporting details to back up the author. Lovelace mentioned the connection to the Jacquard loom several times on her notes.

Lovelace wanted the Analytical Engine to go further than blueprints and prototypes, however due to Babbage's illness, his constant errors and the difficulties in making the new device it never went into production. Babbage's work was interpreted into the fundamental theoretical work of Alan Turing (M. Davis & V. Davis, 2005), an English professor in mathematics, when in 1937 Turing managed to connect the three parts of the Analytical Engine, hardware, software and data. Firstly, Turing's machine, known as the Universal Machine, took an input with a detailed description of the *behaviour* of the machine to be simulated. Secondly, in an effect to *read* the description the machine proceeded to undertake the action asked of it. In 1937 the Universal Machine was the first to be coined as a digital computer.

Hearth (1975) remarks on the close connection between the modern computer and woven textiles. He points out that it is equivalent of having a pattern and wanting a binary sequence

for weaving as having a Fortran programme[15] and desiring a binary code to suit the programme to a computer (Figure 2.16). He also acknowledges the strong aesthetics resemblance between a woven fabric and the wiring of a computer.

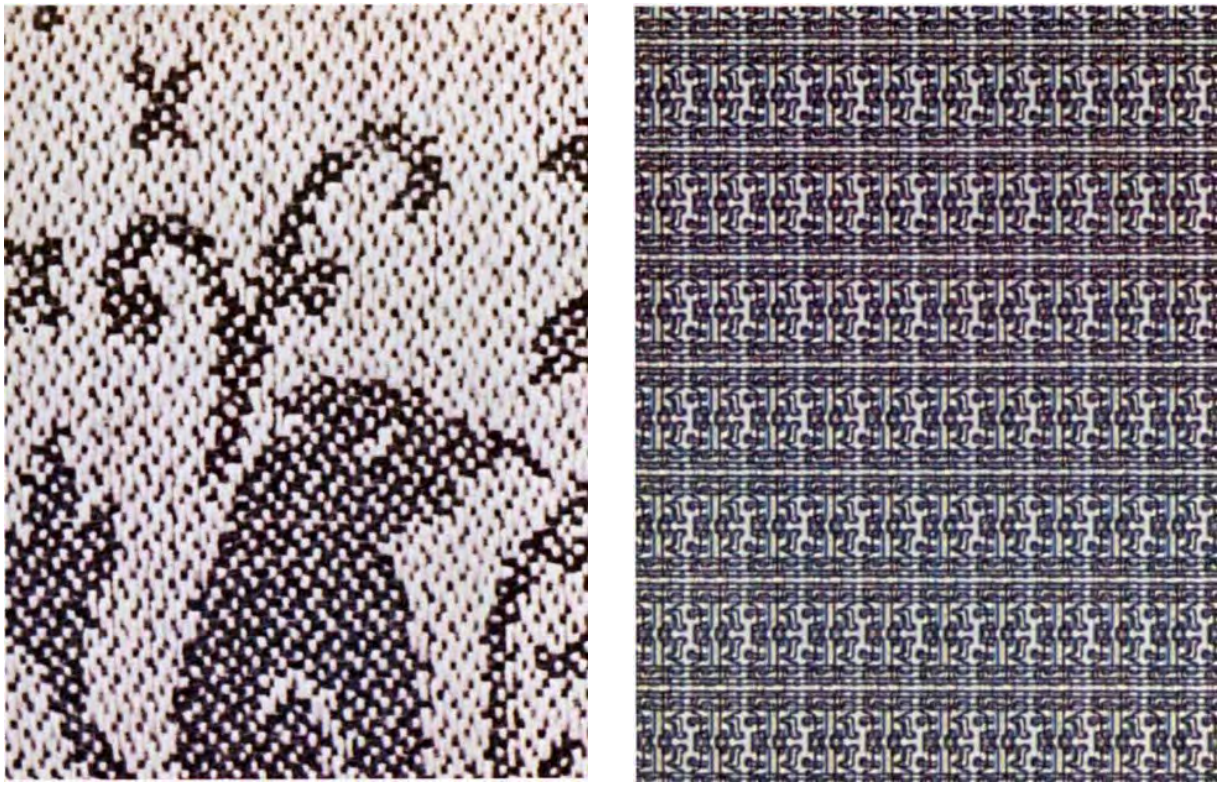


Figure 2. 16. (left) Enlargement of a woven Jacquard textile, (right) an enlargement of a 1,024-bit memory circuit made by Fairchild Semiconductor (Hearth, 1975).

[15] Fortran programme 'was to enable the programmer to specify a numerical procedure using a concise language like that of mathematics and obtain automatically from this specification an efficient 704 program to carry out the procedure' (Backus et al., 1957: 188)

2.2.2. FROM THE EARLY COMPUTER TO THE DIGITAL JACQUARD LOOM

In the early digital computers after the Second World War (1940-1945), a teletype tape was used to introduce inputs to the computer. Although the binary logic and arithmetic is still present, it is not the essential matter of the modern digital computer. The modern digital computer was designed to be all-purpose.

M. Davis & V. Davis (2005) describe the modern digital computer as working with digital data, which is expressed as a sequence of binary symbols. They translate information into zeros and ones of machine code, these binary digits are known as *bits* and strung together in *bytes* of eight. Modern computers can execute instructions of individual steps each of which can be carried out in a completely specified manner or instruction.

The second half of the twentieth century saw computers move from cumbersome and basic number crunchers used by scientists and mathematicians to the more agile, versatile and widely used versions we know today. In 1957 IBM launched Type 650[16], anticipating annual sales between 50 and 250. Two years later, 2,000 computers were in use by the US government agencies and private companies (Plant, 1997). In the 1970s, some university computer centres still used punched cards in their computers to input data (Jefferies &

[16] IBM first mass-produced computer during the 1950s.

Thompson, 2017). By the 1980s what once was a full room-size computer was downsized to a desktop computer. In 1990s IBM was selling 4,000 computers per week (Plant, 1997).

Since the 1990s, computers have gained a significant role in textile practice. To create woven textiles, many textile artists and designers have introduced CAD (Computer-Aided Design) programmes into their work. According to Seo (2015) computer software has given the opportunity to design more complex weave structures.

A decade after the launch of Type 650, IBM presented the Jacquard loom connected directly to a computer at the Hemis Fair in 1968. Visitors were able to use a CAD software to make a design and the design was woven instantly into a textile sample (Bang et al., 2016). The Bonas Machine Company was the first company to introduce electronic Jacquard loom in 1983 (Seo, 2015; Bang et al., 2016). The electronic Jacquard loom took over a decade to become accessible to textile practitioners. It was not until the Norwegian lecturer in textiles, Vibeke Vestby, who invested in the development of a new electronic loom, which has similar functions to the Jacquard loom, that the weaver could weave as any other handloom. In 1995, the Norwegian company Tronud Engineering launched the TC-1 loom.

The TC-1 loom allows the weaver to control every single thread independently, like the Jacquard loom, using a computer connected directly to the loom. The loom read digital files which are controlled with a simple weaving software. In theory, the TC-1 loom is accessible to everyone without prior weaving experience or technical knowledge (Bang et al., 2016). This research uses the TC-1 loom as a part of its practice due to the easy and fast digitalisation and weave of textile samples.

2.2.3. JACQUARD WEAVE AND DIGITAL CODE LANGUAGES

The origins of the computer are intrinsically linked to the digital binary logic of weave and the mechanisation of the draw loom. Since the Jacquard loom and the Analytical Engine, code has evolved and changed. For example, in 2020 to design a website, the programmer writes a set of instructions without using binary language, but instead use English vocabulary such as *stroke*, *color* [*sic*] or *for loop*, becoming a ubiquitous concept (Seo, 2015).

Anni Albers, a Bauhaus weaver and pioneer in weaving as research, was interested in weaving as a form of language. Ancient Writing was the first Albers' series of pictorial weaving with titles referring explicitly to texts and encoded character languages (Tate Modern, 2018). It evokes linguistic characters and systems based on ideographic signs of the ancient world (Garner Troy, 1999). In the artwork Code (Albers, 1962) the floating weft simulates words, that can be associated with a code through the lines and dots of the textile. While Albers looks at code from a weaver's perspective, Joshua Noble, a developer and designer, introduces a definition of code as a:

> …series of instructions that a computer executes when the code is run. It is written in a programming language that, like natural languages, is essentially a contract between two parties. In the case of code, though the two parties are the programmer and the compiler (Noble, 2009: 22).

Noble (2009) sees that the programmers or designers develop a relationship, or contract, with the compiler[17], giving instructions of their ideas to materialise them. Jefferies & Thompson (2017) point out that code itself does not bring the meaning of the artefact, but it is as important to the materialisation of the object due to the object following the grammar and politics of the code. The language of code is not tangible until it is seen in a physical representation like a woven textile.

Seo (2015) reflects upon the work of Sarah E. Clarke, a lecturer in fashion design and performance sportswear, and Jane Harris, a professor of digital imaging, (2012) when they state that fashion and textile practitioners have used code in their practice in three different ways:

- *The look of code:* refers to aesthetics that computers can offer. Since the mid 1960s textile practitioners have been exploring this new aesthetic to incorporate in their practice. By the end of the 1990s, most textile practitioners had access to the computer and therefore it was easier to introduce it into their practice. Playing with the pixel, bits and bytes the look of code started to gain its own aesthetics (Figure 2.17).

[17] A computer programme that translates a programme written in a high-level language into another language, usually machine language.

Figure 2. 17. Kunihiko Morinaga for Anrealage 2011 collection.

- *The material code:* refers to making material digitally tangible through connecting it with the real world by combining handmade and digital techniques such as weaving and coding. As traditional and advanced media converge, new vocabulary and aesthetics of computer-generated design are being composed through both analogue and digital techniques (Figure 2.18).

Figure 2. 18. Eunsuk Hur, Nomadic Wonderland, 2009.

- *The digital imaginings:* refers to the provocative and complex fantasy images generated via computer, which morph images together to create backdrops that would otherwise be unachievable. Soon, fashion designers and magazines started playing with designs between reality and fantasy, creating aesthetics of virtual space (Figure 2.19). As the technology has evolved since Clarke & Harris's (2012) book, projects like Auroboros (2021) who dress the body virtually, have further expanded the field of *digital imaginings*.

Figure 2. 19. Blommers/Schumm for Viktor & Rolf, Long live the immaterial, 2002 collection (Hoorsting & Snoeren, 2002).

2.2.4. DIGITAL CODING WITHIN TEXTILE RESEARCH

The UK Arts and Humanities Council (AHRC) has acknowledged this recent tendency of mixed disciplines (digital coding and textile practice) by funding the research project *Weaving codes, coding weaves* (2014-2016). This section presents studies that look at digital coding within weaving practice, dividing them into three categories in function of how the research approaches digital coding. *Aesthetics of code* is the first section and looks at the aesthetic approaches of code within weaving practice; *Making of code* refers to the design of the code and the impact to the final textile; *Hidden side of code* introduces the materialisation of the inexistent reverse of a digital image.

2.2.4.1. THE AESTHETICS OF CODE

Jimin Seo's doctoral thesis *The Jacquard weave for interior design: valuing arts and crafts through encoding emotion and information* (2015), explores through practice how emotional durability can encourage people to care about the environment during their encounter with textiles. Her research focuses on furniture textiles such as public transportation furniture. She presents woven textiles, using QR codes[18] to weave narrative textiles by encoding into the

[18] QR code is a type of two-dimensional barcode that can store information using standardised encoding modes (Denso-Wave, 2013).

fabric for emotionally durable textiles. According to Seo (2015), the encoded textiles can be an archive that records information or storytelling for people.

She points out that through the *tactile quality* of the textile, the user can have an emotional sense with the textile beyond the sensory perception. The tactile quality concept is further developed in this research (section 4.2.1) with the work of Karana et al. (2014) in order to create textiles eliciting Emotional Experience.

Seo's (2015) research is practice-based where her tacit knowledge and experimentation with weave structure, yarns and QR codes help the research to build a collection of textiles to encode messages. She elaborates an iterative process to integrate QR codes into different colour combinations to test the limitations of it. Her tacit knowledge in weaving and digital practice is vital for the research and production of textiles (Figure 2.20). Seo (2015) adopts an aesthetic often compared to Mondrian paintings or traditional Korean textiles, where squares are the main element of the pattern, however this research argues that Seo's (2015) aesthetics belong to the look of code where the patterns are inspired by the *pixels*, *bits* and *bytes*.

Figure 2. 20. Jimin Seo's QR woven textiles (Seo, 2015).

Michelle Stephens, a researcher and practitioner in weaving textiles, emphasises the importance of the tacit knowledge in her doctoral research, *Coded Cloth: How a generative digital design process for Jacquard weave can reanimate historical pattern archives* (2018). The research is a collaboration with the Silk Museum and Paradise Mill, Macclesfield. Stephens looks at pattern design to digital-led Jacquard weaving through generative design

and programming methods. Stephens uses the generative programming to reanimate the historical archives through data bending archival images (Figure 2.21).

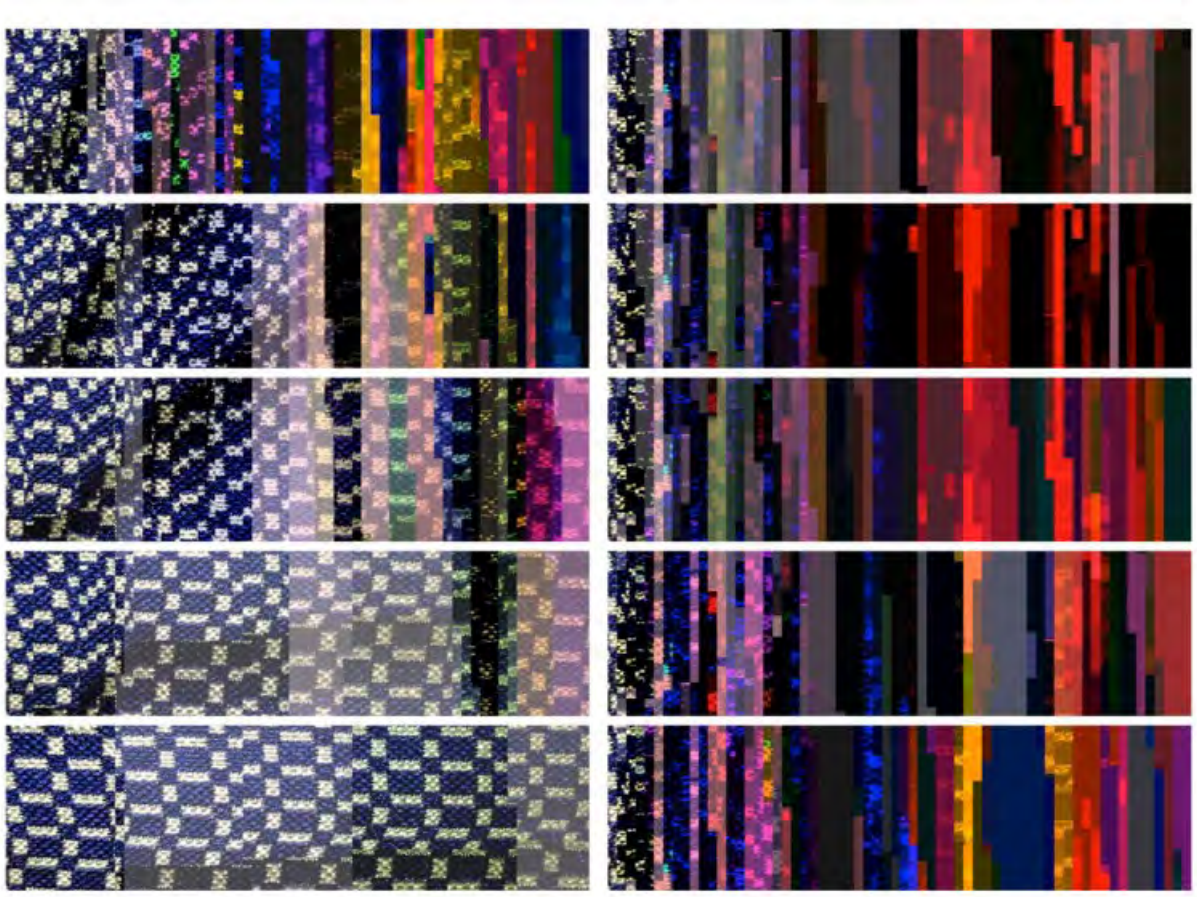


Figure 2. 21. Data bends for Archive No: 54274 (Stephens, 2016).

Like Seo (2015), Stephens (2018) evaluates through her literature review and tacit knowledge as a weaver and programmer, the generative capacity of programming to establish methods of weave design for cloth production. She works with the *random*[19] function to generate a

[19] Randomisation is designed to 'control' (reduce or eliminate if possible) bias. A random process is a sequence of random variables describing a process whose outcomes do not follow a deterministic pattern, but follow an evolution described by probability distributions (Stephens, 2018: xxiii).

new collection of woven textiles based on the archive's textile samples. The code deconstructs the pattern in different degrees until it creates a digitalised new one, where the appearance reassembles the pixels.

Both Seo (2015) and Stephens (2018) use coding aesthetics based on *pixels*, *bits* and *bytes* for their woven textiles. Through the possibilities of modern digital Jacquard and digital coding the *Aesthetics of code* is gaining importance in the textile field. This research supports the *Aesthetics of code* by creating abstract patterns with reminiscence of *pixels*.

2.2.4.2. THE MAKING OF CODE

Seo's (2015) and Stephens' (2018) practices represent Jefferies & Thompson's (2017) idea when they highlight that code itself does not bring the meaning of the artefact, but it is as important to the materialisation of the object due to the object following the grammar and politics of the code. Seo's code aims to transmit information, while Stephens' code is written to deconstruct and reproduce patterns.

In 2017 Alex McLean, a live coding musician, digital artist and interdisciplinary researcher, together with Ellen Harlizius-Klück and Janis Jefferies introduce the research project *Weaving codes, Coding weaves* which was funded by AHRC in 2014-2016. The project is an amplification project, bringing together different views on coding and weaving to create an interdisciplinary team. *Weaving codes, Coding weaves* (2017) is presented in a special issue at TEXTILE journal, which introduces projects conducted during these two years.

The first project presented in the article is by David Griffiths and Alex McLean. They differentiate aspects of weaving, including plain weave, a four-shaft loom, tablet weaving and warp-weighted, in order to get to grips with the complexities of weaves. Griffiths & McLean (2017) present some of the codes and weaves that they developed, drawing to the notion of failure. They give attention to the moments where technology does not work. Griffiths & McLean conclude with the idea that textile culture has much to offer to computer science and software engineering. They claim the need to celebrate both weaving and coding for the creative freedom that engages deeply with the patterns underlying them both. Through the language of coding they weave digital images, using code as a digital language to expand the weaving discipline.

While Griffiths & McLean (2017) present a practice-based research, Ellen Harlizius-Klück (2017) presents a literature review of the algebra of weave and code. The argument is that the codification of the loom setups and standardisations in the first printed books on pattern weaving enabled the French inventors to explore digital control devices such as the draw loom, leading to the Jacquard loom and afterward to the Analytical Engine by Babbage. Her paper informs of the connection between both practices and how the Jacquard loom shaped the present language of code.

The final project presented in the special issue explores the weaving of sound Jefferies and Blackwell. They go back to their practice work *A Sound you Can Touch*, where they explore visual and sonic texture by mapping of textile images into sound. The textile images are scans from complex weaving patterns created by the Jacquard loom. Standard coloured textures are represented digitally and translated into sonic experiences (Blackwell & Jefferies, 2006).

Their code is similar to Stephens (2018) when transforming current patterns into digital representations.

McLean & Griffiths study how to digitally materialise the process of weaving, using the binary logic of '0' and '1' to graphically weave plain patterns. Blackwell & Jefferies (2006) use code as making by translating standard coloured textures into sonic experience. Finally, Harlizius-Klück studies the origins of the draw loom pattern book to understand the binary logic used for computers, hence she is looking into the making of analogue code. The making of code that this research practice adopts is the translation of letters into binary logic that afterwards are woven into textiles.

2.2.4.3. THE HIDDEN SIDE OF CODE

Material Codes: Ephemeral Traces is a three-year artist research-creation project, exploring the relationship between digital data, trustworthiness, tracking and fallibility through artwork. Through this project, a Weaving Data Research Group was established in 2018 to discuss and explore the relationship between data and textiles. Janis Jefferies interviews Kelly Thompson, a researcher in fibres and material practices, about *Material Codes* research project, and they discuss questions around code, data, image, weaving and research engagement (Jefferies & Thompson, 2017).

Thompson is interested in the software as '…a tool that enables the construction of both images and cloth, and the processing capabilities this gives artists to make new

interpretations of the contemporary world in a fast and reasonably direct way' (Jefferies & Thompson, 2017: 168). She contemplates the process of making in both weaving and coding, mentioning the notion of failure and the invisible process of creation that is usually hidden from the final work.

Sophia Borowska, Thompson's assistant during *Material Codes* research project, also presents a practical and theoretical study between coding and textiles, making connections with these two languages. Borowska, like Jefferies & Thompson (2017) and McLean & Griffiths (2017), discusses the notion of failure during the process of making, saying that 'coders and weavers alike know the frustration of repeatedly attempting to build something new, as well as the satisfaction of seeing little bits of thread or code come together— materialize [*sic*]—in exactly the right way' (Jefferies & Thompson, 2017: 167).

Thompson also mentions the hidden sides of weave and digital work. A woven textile has two faces, the front face, where the pattern is exhibit, and the back face, which holds significant information or can even be fully reversible (double-cloth). As the textile is a tangible object, individuals can see both faces of the textile. For instance, for weavers both faces of the textile are significant to understand the process of making. On the contrary, digital images present one perspective, surface or side. Individuals cannot have access to the reverse of the image as it does not exist. The closeness to the reverse of a digital image to understand the process is the code of it. For the weaver working with digital images, they have to adopt a new behaviour and way of thinking during the making when translating the reverse of the digital image into the fabric. By weaving data, like digital images, it changes the medium from the screen or projected light to a surface dimensionality and two faces of the textile. For Thompson, the physical materialisation of data into textiles is an abstraction, a

process of questioning visualisation's authority and drawing attention to the fallible and transitory, otherwise hidden.

Borowska's (2016) work is influenced and connected to Thompson's investigation. Her aim is to research existing links between digital and material processes and practices, historical and contemporary, and to create some new ones. Her methodology is research-creation revolving around digitally assisted weaving; visualising, interoperating, and materialising digital waste as a telling outcome of online culture. While her methodology of investigation revolves around digital assisted weaving as an outcome of online culture, the method approach of this research focuses on Emotional Experience of woven textiles instead of the online culture.

Her project, *Data Excess*, emphasises the importance of embodied engagement with online space and with physical material of woven textiles. Like Thompson, Borowska (2016) transforms a one-sided image into a double-faced textile, where the back face informs of the making. Their reflection is of great value to this research practice at the time to elaborate the physical form and double sidedness of the digital image.

2.2.5. DIGITAL CODING WITHIN TEXTILE PRACTICE

The textile practice has a close relationship with technology, Sonja Weber (2005) (Figure 2.22) and Peter Struycken (2002) (Figure 2.23) move from their tactile perception to visual perception in order to elaborate their woven textiles. Their practices introduce the use of digital coding as a tool, process, and medium all at the same time (Jefferies, 2018).

Figure 2. 22. Bilder aus Kette und Schuss (Weber, 2005).

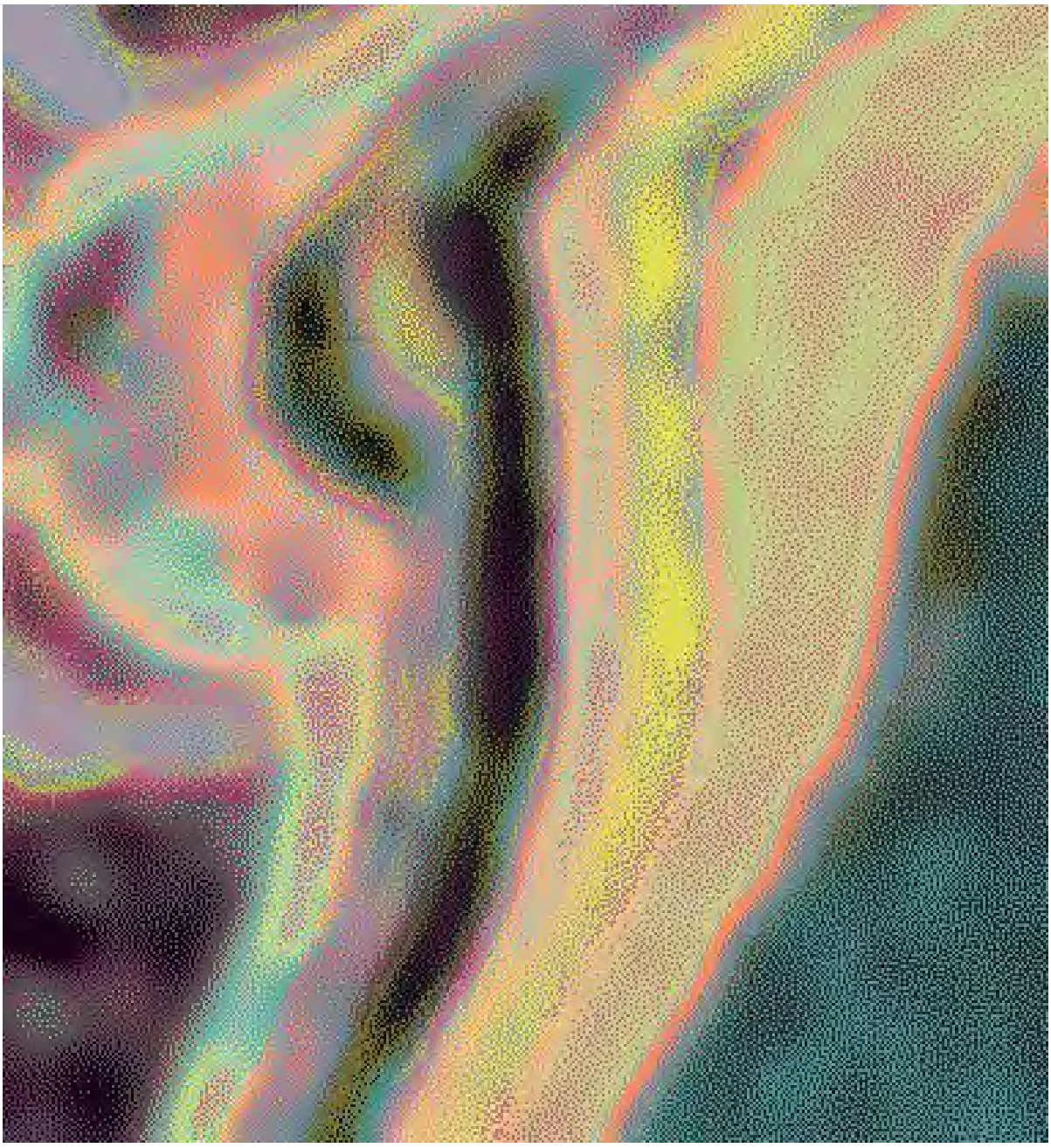


Figure 2. 23. Number 6 (Struycken, 2002).

In the case of Struycken (2002) and Weber (2005), not only was it the fibres that shape the final textile, but also the code behind the textile that communicates a new language and politics of the final work. Since the late 1960s designers have tried to mimic the aesthetic of computer design even before they were able to use this tool. By the 1990s, the computerised

weaving loom was relatively accessible and was embraced by a new generation of textile designers (Clarke & Harris, 2012). The main difficulties that the textile designers faced were to find new aesthetics for the new tool, process and medium, as well as the leap between onscreen visual appearance and physical output.

As highlighted previously by Struycken (2002) and Weber (2005), textile designers have learnt how to work with and between these two worlds, digital and analogue. This creates a hybrid process due to the development of computerised techniques and research undertaken by previous textile designers.

Génératif (Saltet & Paradeise, 2014) (Figure 2.24), Glitch Textiles (Stearns, 2012) (Figure 2.25) and BeatWoven (Ricketts, 2009) (Figure 2.26) are woven projects which have introduced digital coding as a generative design process, '…breaking through the mindset of either hand or machine made' (Ryall & Macbeth, 2016: 78). Digital coding allowed these three projects to generate unique woven textiles due to it visually codifying data following the rules set by the makers and the Aesthetics of code. It could be argued that BeatWoven textiles are not unique due to Ricketts producing more than one textile per design. However each design is unique and different from others as the patterns represent different pieces of music. While BeatWoven and Glitch Textiles use abstract square shapes based on *pixel* to represent data, Génératif uses digital coding to create geometrically randomised unique textiles. Sharing a similar concept, Unmade (Hal Watts et al., 2014) (Figure 2.27), a fashion technology business, creates customised tailored garments, incorporating the participation of the consumer as part of the process of creation via online self-customised (Kwon et al., 2017). The company introduces a basic pattern design, in which afterwards the customer can customise to fulfil their demands. Unmade states that this process '…is the next step of customisation…' (Hal

Watts et al., 2018: online). Julie Helles Eriksen has adopted this new method of customisation in her project Abstract_ (Eriksen, 2015) (Figure 2.28). She examines the transformation of emotions into a visual language by using digital coding, which are represented in knitted and woven textiles and the introduction of human responses on mechanical production. This research argues that both projects, Unmade and Abstract_, evoke an Emotional Experience for the consumer because of the co-design process. Individual's involvement varies in both projects, while Unmade facilitates the consumer to interact with and adapt existing patterns, Abstract_ invites the individual to express, write and share their memories, experience or stories on a white canvas in order for these to be transformed into abstract patterns.

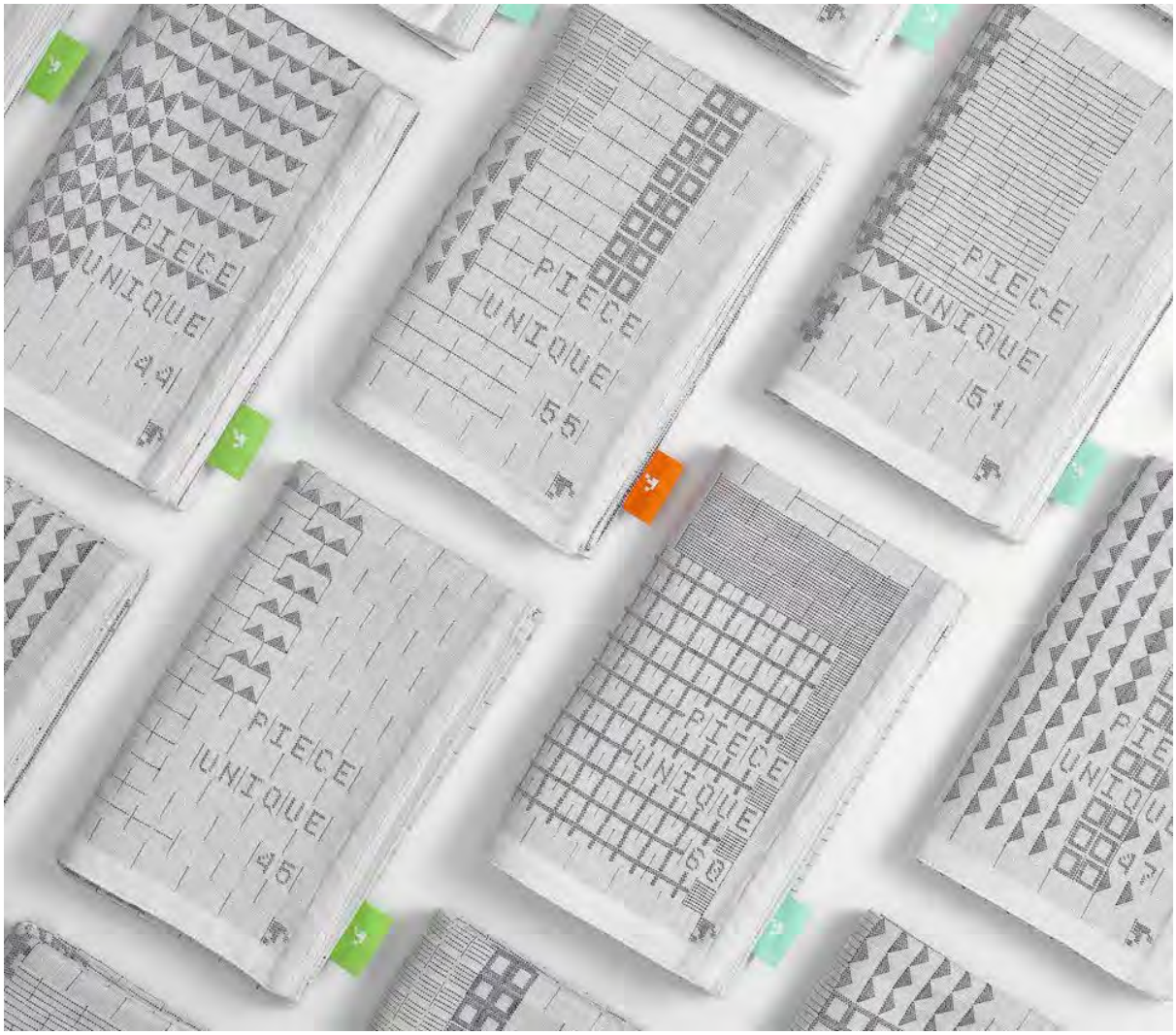


Figure 2. 24. Génératif (Saltet & Paradeise, 2014).

Figure 2. 25. Glitch Textiles (Stearns, 2012).

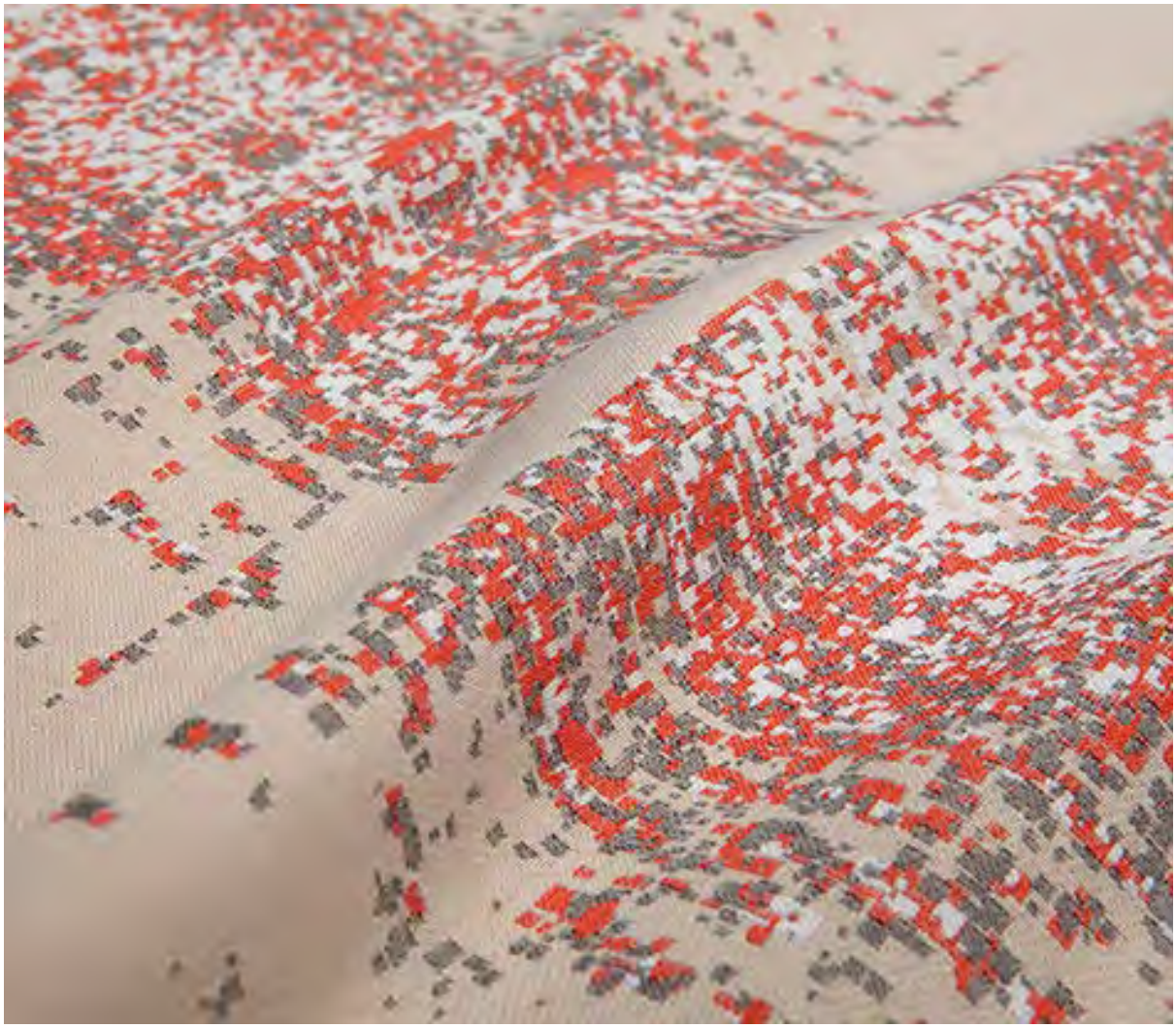


Figure 2. 26. BeatWoven (Ricketts, 2009).

Figure 2. 27. Unmade (Hal Watts et al., 2014).

Figure 2. 28. Abstract_ (Eriksen, 2015).

Woven Memories (2016) (Figure 2.29) was created to introduce an Emotional Experience for the individual, collaborating in the creation of a scarf by sharing and typing memories to be translated into patterns. Both Abstract_ and Woven Memories represent Niinimäki & Koskinen's (2011) idea of promoting *Emotional Attachment*, which is created through the consumer's involvement in the design process and offers a deeper Emotional Experience stimulated by the output that *carries* memories of both a certain design stage and personal events.

Figure 2. 29. Woven Memories (Nadal, 2016).

2.2.6. SUMMARY

While Unmade (2014), Abstract_ (2015) and Woven Memories (2016) are projects that create garments and therefore have an extra element that influences the Emotional Experience of the textile, this study does not focus on the element of wearing the garment. Instead, it focuses on the physicality of the textile. The practice of this study reflects on the work of Seo (2015), Borowska (2016), Jefferies &Thompson (2017) and Stephens (2018). While Seo's (2015) research focuses about the craftmanship of digital textiles, Stephens' (2018) methodology of analysis and evaluation of data blends influence the methodology of the research practice. Jefferies & Thompsons' (2017) idea of the woven reverse of a digital image is discussed during Stage Three of the practice of this research (section 4.2.3.1) where there is a further discussion of the look and Aesthetics of code, Making of code and Hidden side of code.

2.3. CO-DESIGN PROCESS

*Abstract_* (Eriksen, 2015) and *Woven Memories* (Nadal, 2016) incorporate the participation of customers as part of the process of creation of garments and accessories respectively, via online interfaces to elicit an emotional association. This section of the literature review centres on Participatory Design (PD), focusing on co-design and mass-customisation processes to create an approach for this research practice, which fulfils the needs of the research question. It presents an overview of the participatory design and its categories within this discipline before introducing co-design and mass-customisation processes. This is followed by looking at customer co-designer and perceived value to present elements that can have an impact on the elicitation of participants' Emotional Experience in this research practice.

2.3.1. PARTICIPATORY DESIGN

Participatory Design (PD) has matured after more than four decades as a research discipline in the field of design practice. Its approach to design attempts to actively involve individuals during the design phase to ensure that the final outcome meets their needs (Sanders, 2008; Robertson & Simonsen 2013). Robertson & Simonsen (2013) provide a detailed definition of PD in *Participatory Design: an introduction*. They define it as:

> …a process of investigating, understanding, reflecting upon, establishing, developing and supporting mutual learning between multiple participants in collective 'reflection-in-action'. The participants typically undertake the two principal roles of users and designers where the designers strive to learn the realities of the users' situation while

> users strive to articulate their desired aims and lean appropriate technological means to obtain them. (Robertson & Simonsen, 2013: 2)

The origins of this definition can be traced back to Kensing & Blomberg (1998), when they point out that the epistemological stand of PD is the cooperation between individuals and designers within a specific design project. Its roots are from Scandinavian trade unions in the 1960s and 1970s (Sanders, 2008; Sanders & Stappers, 2008; Bannon & Ehn, 2013; Kensing & Greenbaum, 2013; Robertson & Simonsen, 2013). In the early 1970s, Kirsen Nygaard, a computer scientist, and Olav Terje Bergo, an economist, from the Norwegian Computing Centre (Norsk Regnesentral) collaborated with the Iron and Norwegian Metal Workers Union in order to give voice to the workers at the time computers were being introduced into the workplace (Kensing & Greenbaum, 2013).

The collaboration of Nygaard and Bergo with the Norwegian Metal Workers Union to give a voice to those who traditionally lack power in the development process, was triggered by new management strategies and changes in political policy. Businesses were starting to implement new management strategies, where they sought to increase automating tasks and de-skill workers. By the standardisation and simplification of tasks, the workers could be easily interchangeable. In this way, it resulted in lower wages for the workers and the management having a better control of the workforce (Kensing & Greenbaum, 2013).

There were also changes happening politically around the globe; in Germany and Austria, a new type of process, Future Workshop, was becoming popular. Future Workshop intended to increase the involvement of citizens in local issues (Junk & Müllert, 1987). Meanwhile, in the USA, where people were protesting for civil rights and to highlight urban problems, a new way of designing, called Participatory Action Design, started to gain importance in the

research and public communities. These political and social tensions were reflected in the field of computer science.

PD has evolved from these origins - although its development is still ongoing - focusing on the *how* of designing, rather than the *what* of design. The PD approach is founded on the belief that people are creative (Sanders & Stappers, 2008), and therefore have the right to be involved in the design phase, especially when the design is related to their lives, environments, and livelihoods. Ezio Manzini (2015), has been influential in using variations of PD methods, supporting the establishment of community-driven collaborative design groups around the world. In his book *Design, when everybody designs: An introduction to design for social innovation,* Manzini (2015) distinguishes between diffuse design and expert design. *Diffuse design* refers to design performed by everyone, while *Expert design* is performed by individuals who have been trained as designers. The job of expert designers is to support collaborations such as community-driven projects. He categorises the participant involvement during collaborative design encounters, distinguishing two degrees: active involvement and collaborative involvement (Figure 2.30). Active involvement refers to what participants are asked to do in practical terms, moving from passive to active involvement. Collaborative involvement is the extent to which participants are engaged in some form of collaboration.

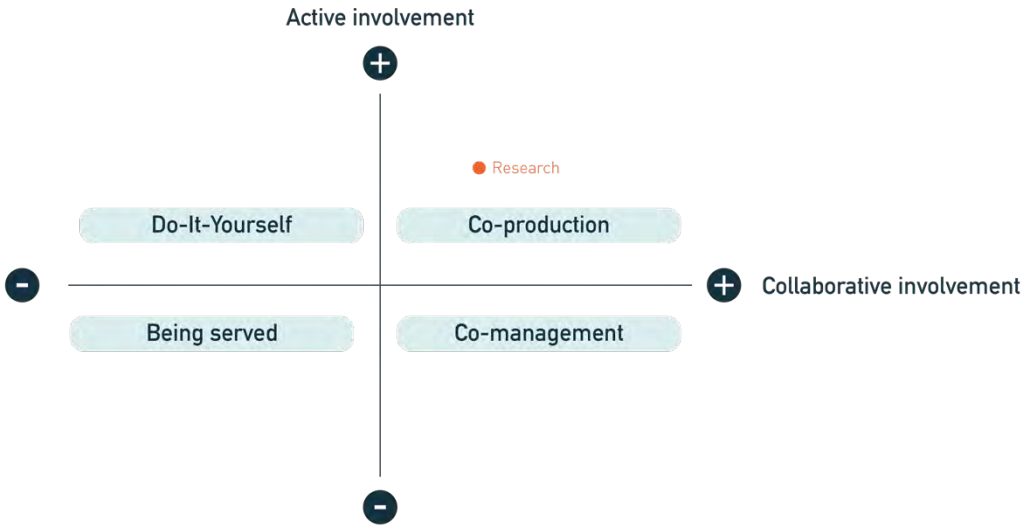


Figure 2. 30. Participant involvement during collaborative design encounters (Manzini, 2015).

Manzini (2015) describes the four participant's modes that are shown in the table. The quadrant *Being Served* refers to the low involvement both in activities to carry out and collaborative set up; the quadrant *Co-management* is associated with low involvement of users for practical activities but it includes collaboration in the design process; quadrant *Do-It-Yourself* is the intense involvement in activities but conducted individually; finally, the *Co-production* quadrant refers to the intense involvement in activities as well as in collaboration during the design process. This research sits in the *Co-production* quadrant, where participants are involved in the design process of jacquard textiles, being in constant conversation with the designer, in an iterative and collaborative design process.

2.3.2. DIFFERENCES AND SIMILARITIES BETWEEN PARTICIPATORY DESIGN, CO-PRODUCTION, CO-CREATION & CO-DESIGN

PD, co-production, co-creation and co-design are terms that have been interchanged and treated synonymously in participatory-led design. For instance, Metz (2015) presents a differentiation of the terminologies based on the tendency of the fields to use one or another. He states that the term co-production is often discussed in socio-environmental science, while business literature tends to use the term co-creation to refer to the same concept of individuals' involvement during the development process. Even though Metz (2015) gives this differentiation, there are more substantial differences in meaning between PD, co-production, co-creation and co-design. Sanders & Stappers (2008) point out that co-creation and co-design terminologies are substituting the PD term, however in this research co-creation and co-design are seen as sub-categories of PD.

PD has different actions and therefore it could be understood and used in different ways. Healthcare, consumer behaviour, design, and business have introduced and adapted PD to fulfil their needs. The different adaptations of the collective reflection-in-action process creates variations in PD field. For instance, co-creation has very different definitions depending on the context it operates in. Prahalad & Ramaswamy (2004) were the first to coin the co-creation term defining it as '…the practice of development systems, products, or services through collaboration with customers, managers, employees, and other company stakeholders' (Prahalad & Ramaswamy, 2004: 4). Voorberg et al. (2014) state that co-creation is an active involvement of the individual in various stages of the production process, while PD could also have passive involvement processes. While Ramaswamy & Prahalad (2004) and

Voorberg et al.'s (2014) perspectives are business centred. Sanders & Stappers (2008) take co-creation to refer to:

> …any act of collective creativity […] a very broad term with applications ranging from the physical to the metaphysical and from the material to the spiritual, as can be seen by the output of search engines (Sanders & Stappers, 2008: 6).

Nielsen (2011) brings a more specific definition stating that users possess knowledge of their own needs that help at the time to design the final output, but contrary to PD, their collaboration may not have a direct impact to themselves. The designer, researcher and user collaborate on the tools for ideation. Teichmann et al. (2016) identifies co-creation as the …'joint value creation of companies and customers' (Teichmann et al., 2016: 16). His definition is in line with Lusch & Vargo (2006), where they focus more on co-creation as a value. The co-creation value can only be created with and determined by the individual in the consumption process and through use.

There is a distinction between co-creation and co-design, but the terms are often used interchangeably. Co-creation allows the costumer to be part of the design of the service experience to suit their context by elaborating tools for ideation, while co-design addresses the problem and solution with them being the direct beneficiary of the collaboration.

Lusch & Vargo (2006) present a definition of co-production as '…the participation in the creation of the core offering itself' (Lusch & Vargo, 2006: 284). In other words, whilst co-

design involves the individual in the design phase[20] (Piller et al. 2005; Teischmann, 2016), co-production transfers the employees' tasks to the individual to embed a solution[21].

Voorberg et al. (2014) present extensive research on the differences and similitudes of co-creation and co-production in social innovation. They use a quantitative method to analyse and compare the co-creation and co-production concept. Their results posit that to a large extent both terms are seen and defined similarly, where the main difference between the two terms is that co-creation literature focuses more on co-creation as *value* (Vargo & Lusch, 2004; Gebauer et al., 2010) and sees individuals as co-designers while co-production sees individuals as co-implementer of the service (Voorberg et al., 2014).

Friedrich (2013) introduces Kaulio's (1998) work on individual involvement methods based on longitudinal and lateral dimensions (Figure 2.31). For Kaulio (1998) longitudinal dimensions are the phases of the design processes in which individual involvement takes place; for example, prototyping or involvement with the final product. The lateral dimension refers to how deeply an individual is involved in the design phase. In other words, which preposition is used: design *for* them, design *with* them or design *by* them. *Design for them* refers to outputs design on behalf of the individual. *Design with them* denotes a participation of individuals during the product development of proposed design solutions to find a final one that will be applied to potential customers. *Design by them* is the approach where the individuals are actively involved in the design of their own product (Eason, 1992; Kaulio, 1998). Co-creation,

[20] FREITAG offers customers to select different elements of the product design. In 2019 welcomed an in-store co-design process (Designboom, 2019: online).

[21] IKEA (Kamprad, 2021) furniture is conceptualised for the customer be active in the assemble process.

co-production and co-design are part of the individual involvement methods. Resonating with this idea, Christopher Frayling (1993) elaborates the concepts of *Research into art & design, Research through art & design,* and *Research for art & design* based on Herbert Read's (1943) distinction about art education (section 3.1).

Using Kaulio's (1998) individual involvement methods chart as a reference, Figure 2.32 shows an adaptation of the longitudinal and lateral dimensions of user involvement to distinguish co-creation, co-production and co-design.

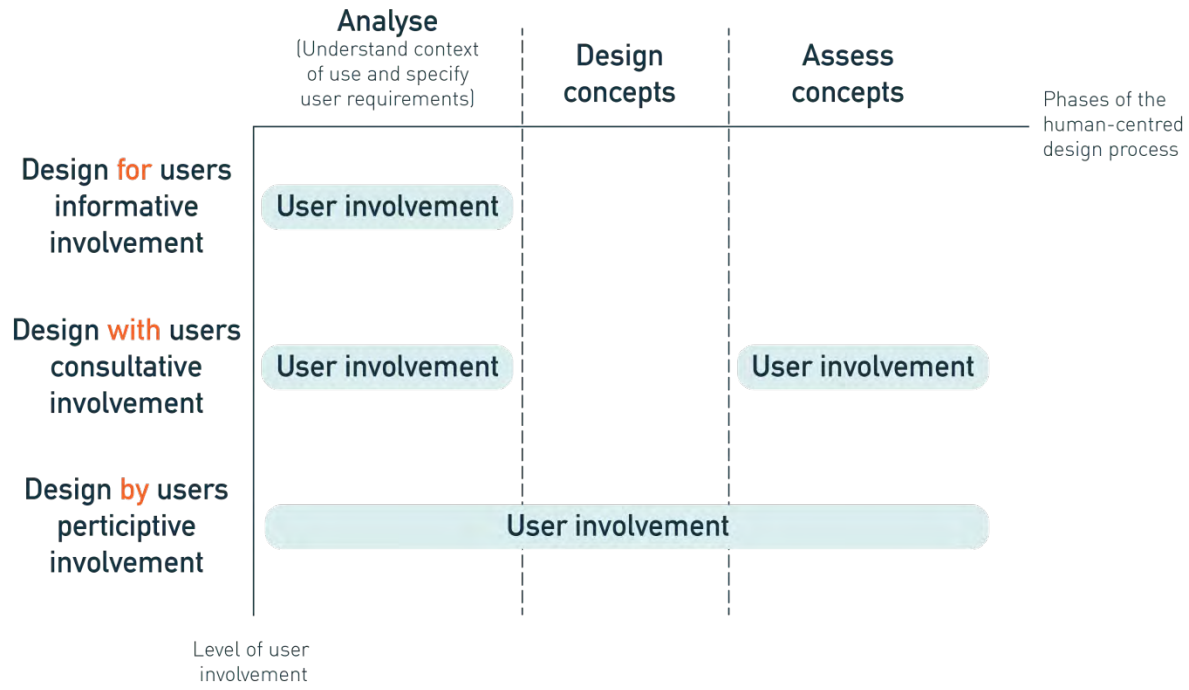


Figure 2. 31. Re-design of Kaulio's (1998) individual involvement methods.

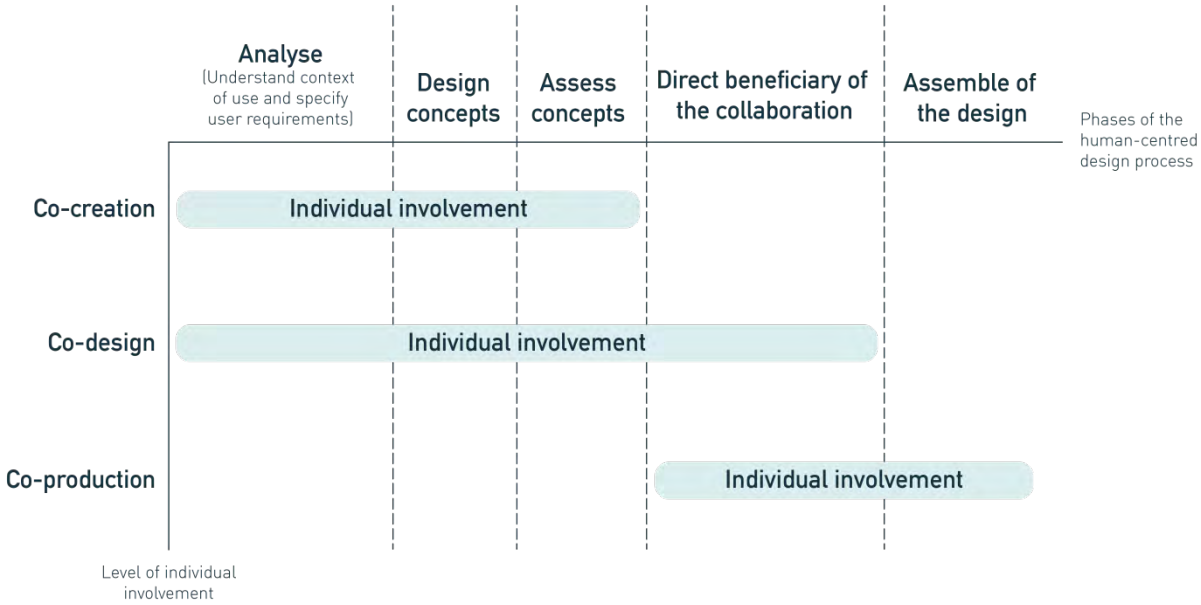


Figure 2. 32. Adaptation of Kaulio's (1998) individual involvement methods to compare co-creation, co-design and co-production.

2.3.3. CO-DESIGN

While the section above presented similitudes and differences between terminologies used in PD, this section focuses on the term co-design used in this research. Thallmaier (2015) points out that *co* in the word co-design originally stems from the Latin prefix *co,* meaning together, mutually or jointly. The word *design* was incorporated in the English language in the fifteenth century and came to achieve its present significance via Italian and French (Bannon & Ehn, 2013). In English, this term currently acts as a noun and a verb; as a noun it means product, intention, plan, intent, aim, scheme, plot, motif among other things. As a verb (to design) it means to concoct something, to stimulate, to draft, to sketch, to fashion; it is a process of making. Its roots can be traced back to the Latin term *signum* – meaning sign, designate or appoint. Thus, co-design expresses the relation of two subjects during the

making and sketching phase. Sanders & Stappers (2008), present a comprehensive study regarding co-design, *Co-creation and the new landscape of design*, where they introduce a detailed definition of co-design.

> We use co-design in a broader sense to refer to the creativity of designers and people not trained in design working together in the design development process. (Sanders & Stappers, 2008: 6).

Fleishmann (2015) remarks Shaughnessy's (2013) idea of the omnipotent designer is no longer omnipotent, and is subsequently having to adapt the process of creation in order to embrace participatory procedures. The presumption in co-design is that individuals should be involved and contribute to topics of relevance to themselves and that their experiences are crucial in the design phase (Mattelmäki & Sleeswijk, 2011; Salmi & Mattelmäki, 2019). Salmi & Mattelmäki (2019) state that the co-design process invites designers to step into the *in-between space*, referring to the process where the designer is in both domains: *Crafting* and *Being crafted*. Although they introduce this notion of *In-between space*, they do not define and clarify the right balance of *Crafting* and *Being crafted* in order to have a real *Participatory mindset*. The absence of this clarification can lead to uncertainty of the balance of power during the co-design process. This research defines *Crafting* domain as the process where the designer has the full knowledge and skills to dominate the conversation or design process; while *Being crafted* domain refers to being passive when designing. For a democratic collaboration during a co-design process, *Crafting* and *Being crafted* domains should be equally balanced. The drawback of the *In-between space* is that it does not have any methodical procedures in place, and consequently, can cause confusion.

The process of co-design has multiple approaches depending upon the mindset of the practitioner (Sanders & Stappers, 2008). Teischmann et al. (2016) distinguish two co-design approaches: co-design as an open innovation process (von Hippel, 2005) and co-design as mass-customisation (Franke & Schreier, 2010). The first refers to the integration of a sample of individuals during the design phase of an output, which are then offered to a broader base of individuals (Franke & von Hippel, 2003). Whereas in the mass-customisation approach, the individual is integrated to the design phase by matching or modifying their solution from a pre-defined list of options (Piller at al., 2005).

Based on Sanders & Stappers' (2008), Thallmaier's (2015) and Teischmann et al.'s (2016) research, this research defines co-design as the democratic collaboration and cooperation of designer and individual in the design development process, by selecting a set of options from a pre-defined list. In this research, *designer* refers to the practitioner responsible for the design project, while *individual* refers to those who participate in the design phase.

2.3.4. COMPUTER-LED CO-DESIGN EXPERIENCE

Co-design has been approached from different fields such as design (Sanders & Stappers, 2008), healthcare (Brady et al., 2019) and human computer science (Turner & Welch, 2019). Through the literature of co-design, different techniques have been developed in order to fit the field needs. Healthcare uses workshops to provide opportunities for participants to collaborate, improve and re-design the healthcare system (Procter et al., 2014), human-centred computer science explores mass-customisation as a form of co-design (Turner &

Welch, 2019) and design centres on focus groups to develop, analyse and design new products (Janigo & Wu, 2015). This research creates a mixed technique between design and mass-customisation literatures called computer-led co-design experience.

The idea of computer-led co-design experience comes from the doctoral theses of Kate Herd (2012) and Pirjo Friedrich (2013), where both studies involve web-based co-design. For Friedrich (2013), web-based co-design is '…the systematic and facilitated process for collaborative design in which users play an active role via online tools' (Friedrich, 2013: 58). It implies early ideation, active participation by individuals and systemic design process and methods. Herd (2012) mentions three elements with a negative impact of web-based co-design: the lack of sensory perception, the absence of the designer at the time of designing causing mass-confusion[22], and the impossibility to experience the final product.

Drawing from web-based co-design and the definition of co-design presented for this research, computer-led co-design experience is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Offline digital computer tools refer to digital interfaces, and are not online, in which individual and designer can be active at the time to design and visualise the final outcome.

[22] Mass-confusion refers to the perceived confusion at the time to make co-design the product. For more information see section 2.3.7.

One of the strengths of applying a computer-led co-design experience approach is the visualisation of the final outcome. Rogoll & Piller (2004) point out that visualisation is '…one of the strongest instruments to create trust and reduce the risk perceived by the user – and to increase willingness to purchase' (Rogoll & Piller, 2004: 10-11). Like web-based co-design, the drawback of it is the impossibility to experience the final product.

On the opposite side of web-based co-design is in-store co-design (Herd, 2012). In-store co-design refers to the act of co-designing a final output in situ with the help of a designer, and being able to interact with materials. Some in-store co-designs are instant production, in others the customer needs to wait for the final product. In order to reduce disadvantages of computer-led co-design experience, computer-led co-design experience introduces two elements of in-store co-design: the ability to experience sensory perception of materials by introducing a textile guide during the process, and the active role of the designer to assist during the design process. However, the computer-led co-design experience shares the same drawback as mass-customisation, web-based co-design and in-store co-design, where the individual cannot experience the final product during the process of making.

2.3.5. MASS-CUSTOMISATION

Computer-led co-design experience emerges from co-design mass-customisation approaches; thus, it is relevant for this thesis to present an overview of mass-customisation literature.

Through the introduction of mass-customisation into commercial settings, the research community started showing interest in the matter, where the main research into mass-customisation was driven by engineering, business and management perspectives. In 1970, Alvin Toffler was the first to predict mass customisation of products, however, it was Stan Davis (1987) who coined the term mass-customisation and since then, this concept has evolved. Like any new areas of research, researchers strive to make their claims upon the field, thus creating a rapid development in vocabulary. As the field matures, the accepted terminologies go through a natural process of iteration and new meanings.

An abundant amount of literature exists with definitions and classifications of mass-customisation. Broadly, mass-customisation is a concept relatively easy to understand, but a detailed definition of it can cause issues among researchers due to variety of meanings, interpretations, and applications across a wide range of products, services, and industries (Herd, 2012). Da Silveria et al. (2001) points out that mass-customisation can be defined broadly or narrowly, using either the concept proposed by Davis (1987), or narrower, practical definitions (Herd, 2012). Davis (1987) builds on the observations published by Toffler in 1970, where Toffler argues the increasing demand for individualisation could cause the disappearance of mass-production markets forcing business to change towards each individual's needs. Gilmore & Pine II (1988) point out that customisation is manufacturing a product in response to a particular customer's needs, while mass-customisation means doing it in a cost-effective way. Piller (2002), one of the key researchers in the field, is among the first to provide a detailed and widely accepted definition of mass-customisation. He suggests that mass-customisation is:

> …the production of goods and services for a (relatively) large market that exactly meets the needs of every individual demander with regard to certain product characteristics (differentiation option) at costs roughly corresponding to those of standard mass-produced goods (cost option). The information collected in the course of the process of individualization [*sic*] serves to build up a lasting individual relationship with each customer (relationship option) (Piller, 2002: 121).

Thallmaier (2015) introduces Müller's (2007) expansion of Piller's definition by introducing four fundamental principles that characterised the concept of mass-customisation:

- *Competitive Advantage*: adds an additional value for the customer due to it stemming from the possibility to react to the individual needs of each customer. Thallmaier (2015) points out that businesses that allow customers to adapt and modify their products may gain advantage over those businesses with standardised products.
- *Mass Efficiency*: businesses that incorporate mass-customisation as an economic strategy, aim to operate as efficiency as in mass production. Müller distinguishes two mechanisms: The first concerns the economics of integration, by using the customer know-how approach to reduce the risk of the introduction of undesirable products. The second provides limits to the solution space in terms of customisation options.
- *Stable Process Architecture*: because mass-customisation cannot provide the same level of individualisation as traditional individualisation concepts such as crafted products in order to have a high mass efficiency, they develop a *solution space*. *Solution space* allows for the desired individual customisation and concurrently limits the potential variations, so that the cost of logistics or production do not increase for any given product variation.
- *Customer Co-design*: the customer, although not professionally trained in the design domain, acts as a co-designer to ideate, elaborate, and create the design specification

> for their desired product. For this reason, one key element that mass-customisation relies on is the involvement of the customer into the creation process.

Computer-led co-design experience focuses on the last two principles, *Stable Process Architecture* and *Customer Co-design*. It creates a solution space to limit the potential variables, while the customer is active during the process of designing the final outcome. Aligned with Toffler, Davis (1987) and Müller (2007), Duray (2002) sees mass-customisation as '…the building product to customer specifications using modular components to achieve economies of scale' (Duray, 2002: 317), meaning the involvement of the customer and modularity is essential to mass-customisation. Kaplan et al. (2007) and Thallmaier (2015) see mass-customisation as a strategy to provide individualised value to customers at a price of non-customised products. Despite the previous definitions of mass-customisation, this research is more aligned with Salvador et al. (2009) when they state that the principle of mass-customisation is:

> …to view it basically as a process for aligning an organization with its customers' needs. That is, mass customization [*sic*] is not about achieving some idealised state in which a company knows exactly what each customer wants and can manufacture specific, individualized [*sic*] goods to satisfy those demands – at all mass-production costs. Rather it is about moving towards these goals by developing a set of organizational capabilities that will, over time, supplement and enrich an existing business (Salvador et al. 2009: 71).

Salvador et al. (2009) focus on the customer experience rather than business-oriented analysis and definition of mass-customisation. Mugge et al. (2009b) introduce the concept of *product personalisation*, where its aim is not business oriented but rather focuses on the '…personal relevance to the consumer…' (Mugge et al., 2009b: 81). In conversation with Salvador et al. (2009) and Mugge et al. (2009b), this research is interested in mass-

customisation for providing individualised value to each customer in response to the fact that particular customer's needs by developing a set of organisational modular capabilities.

Müller (2007) introduces the concept of customer co-design; however, as Herd (2012) states, the experience of the customer as a co-designer remains relatively unexplored. In the next section, the term customer co-design is explored and related to perceived value.

2.3.6. CUSTOMER CO-DESIGNER

One of the key elements of mass-customisation and co-design is the involvement of the individual within the design process, Müller (2007) describes them as *customer co-designer*.

Having introduced the notion of co-design, the democratic collaboration and cooperation of designer and individual in the design development process by selecting a set of options from a pre-defined list, there is a need to define the term customer. According to Sampson & Fröhle (2006) customers can be seen as the individuals or entities who decide whether to compensate the service provider for its production. Hence incorporating the term customer means that the co-design process is done with the individual who will receive and use the co-designed outcome and compensate the service provider. By introducing the customer in the design process, it changes their role from a consumer of a product to a partner in a process of adding value (Herd, 2012). Thallmaier states that customer co-design:

> …describes a development process in which the customer and provider collectively ideate, elaborate and create a design specification for a product, which is purchased by the customer (Thallmaier, 2015: 11).

According to Mugge et al. (2009b) the advantage of incorporating the customer into the design process is that the output accommodates directly the needs of the customer. Thallmaier's definition is inspired by Tseng & Piller's (2003) definition of customer co-design when they point out that:

> customer co-design describes a process that allows customers to express their product requirements and carry out product realization processes by mapping the requirements into the physical domain of the product (Tseng & Piller, cited in Tallmaier 2015: 11).

This research is in line with Thallmaier's (2015) definition of customer co-design rather than Tseng & Piller's (2003). Thallmaier describes the active creative involvement of the customer, while Tseng & Piller see the customer co-design as a more passive collaboration. During the customer co-design process, the customer ideates, elaborates, and creates design specifications of the product from an infinite set of options at the configuration stage. The customer is being introduced and integrated into the value creation of the supplier (Piller et al., 2017). By introducing the customer into the design process, it automatically turns the process into a service and customising a service automatically turns it into an experience (Gilmore & Pine II, 1988). By creating a customer co-design experience, it naturally engages a customer in an inherently personal way. In agreement with Gilmore & Pine II (1988), Herd (2012) points out that the engagement and involvement of the customer in the design process is the result of an emotional connection with the outcome. She recognises that the co-design experience goes beyond the sole activity of co-design and each co-design experience differs from each individual. Herd's idea is based on Gamble et al. (2006) when they state that:

> each customer experience is delivered through the manifestation, in the customer's eyes, of a company's brand values and personality, products and propositions, service delivery and community interaction. The combination of all

> these elements creates a unique customer experience, unique since each customer will have his or her own individual perceptions (Gamble et al. 2006: 246-247).

Kaplan et al. (2007) point out that the nature of mass-customisation is not only on the tangible product but also the co-design experience of the customer. The process cannot be separated from the product, encompassing tangible and intangible elements from the beginning of the co-design process until the disposal of the product (Herd, 2012), and it is often difficult to define where the customer co-design experience begins and ends. Gamble et al. (2006) defines customer experience as '…a blend of a company's physical performance and the emotions that it evokes' (Herd, 2012: 29).

Customer co-design experience has crossovers with other fields such as user centred design, product design, interaction design and human computer interaction. All these fields have introduced models and frameworks to understand the notion of experience. For instance, user centred design focuses on the relationship between people and product, incorporating terms such as *Pleasure-based approaches* (Jordan, 2003) and *Three levels of Design* (Norman, 2004) discussed in section 2.1.2. Computer-led co-design experience creates spaces for ideation, creation, and elaboration of textiles to elicit Emotional Experience. It recognises that the experiences of the collaboration are reflected in the final product and therefore can elicit an emotional connection.

2.3.7. PERCEIVED VALUE

Co-design experience is closely related to perceived value. Perceived value is described as '…an abstract multi-dimensional construct, which is frequently applied to better understand *how* customers assess and evaluate the utility of a product or service' (Thallmaier, 2015: 23). As Sanchez Fernandez & Iniesta Bonillo (2007) point out, perceived value is the core of different concepts to describe, understand, and elaborate the value creation process from a customer's perspective. Woodruff (1997) introduces the three communalities that characterised most definitions of perceived value:

- It is linked to the use of a product or service.
- It is not an objective measure, being a subjective construct, which is created by each single customer.
- It is a trade-off between the benefits that the customer receives from the product or service and the risk facets that they are willing to accept. (Thallmaier, 2015: 24)

The trade-off between the perceived benefits and risks is an area that has been paid much attention by researchers to understand the subjectivity and complexity of the matter. Researchers in this field have distinguished two main sources of the value creation. The first value arises from the possession and usage of the product and service that has a better feeling. The second value originates from the involvement in the co-design process and the *Mental Effort* and/or *Physical Effort* that customers put into it (Thallmaier, 2015).

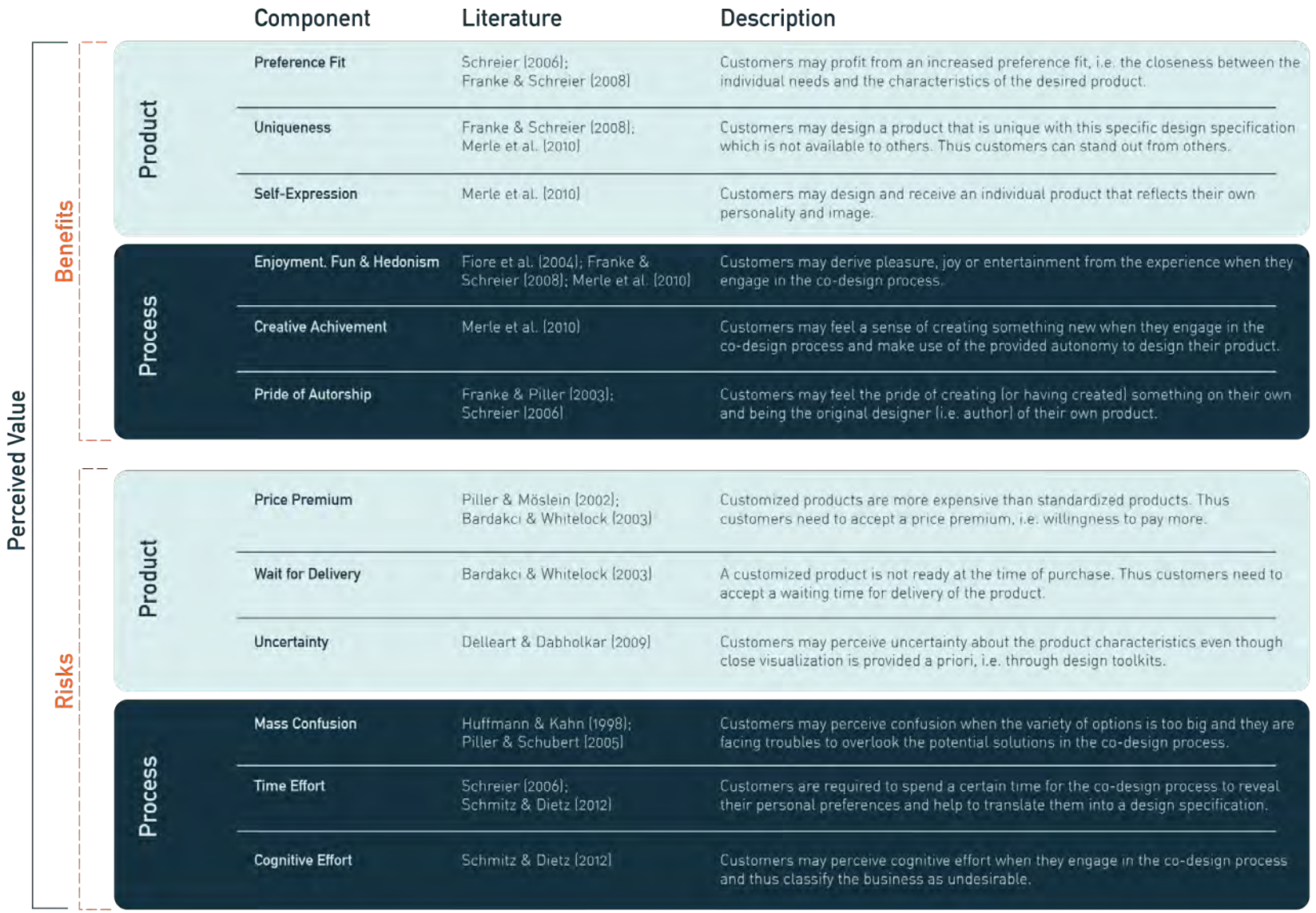


Table 2. 1. Adaptation of Thallmaier (2015) Customers perceived value in mass-customisation and co-design.

As shown in Table 2.1, Thallmaier (2015) summarises the benefits and risks of perceived value into product and process, which then are divided in sub-categories. In this research, all the categories are analysed excluding two of the perceived risk concerning the product, *Price Premium* and *Wait for Delivery*, as they are not related to the aim of this investigation. While the perceived benefits of product and process are satisfied through the computer-led co-design experience, the perceived risks of product and process need more attention.

Even though computer-led co-design experience offers a graphic representation of the final outcome, it can arouse an uncertainty perception due to its intangibility. This is a major issue shared in mass-customisation and other co-design processes, where there is not an instant production of the final outcome. Another factor to consider during the design of the computer-led co-design experience is mass-confusion. Mass-confusion is the perceived confusion at the time of co-designing the product. Piller et al. (2005) distinguishes three problem categories regarding mass-confusion:

- *Burden of choice*: the excess of variety of choices and options can be overwhelming and complex for the customer.
- *Matching needs with product specifications*: in addition to burden of choices, some customers may experience a lack of knowledge or skills to transfer their needs into a specific product.
- *Information gap regarding the behaviour of the manufacturer*: the process of co-designing is still an unfamiliar process for some consumers and can create an uncertainty towards the manufacturer.

Another perceived risk during the co-design process is *Time Effort*. The time needed to proceed and reveal the personal needs and preferences and then translate them into the design process. The designer needs to respect and understand the time needed by the customer at the point of making decisions. Thallmaier (2015) uses the term *Cognitive Effort*, while Mugge et al. (2009a) refers to *Mental Effort* to the customer's degree of creative involvement. A balanced co-design process means that designer and customer share control over the final product, hence the *Cognitive Effort*/*Mental Effort* is higher than a pre-set of options chosen by the designer. *Mental Effort* is part of the seven dimensions of personalisation (Mugge et al., 2009a):

- *Physical Effort*: refers to the physical effort that the customer puts into creating the product or service. For instance, an online co-design process has a minimal physical effort while an in-store process has a higher physical effort.
- *Flexibility*: relates to the degree of flexibility of personalisation and/or modification, if it can be personalised and/or modified only once or multiple times.
- *Initiation*: concerns with who initiates the personalisation process; designer or customer. If the designer has introduced options of personalisation to the final design or the customer has modified a final product to accommodate their needs.
- *Goal of Product Personalisation*: refers to the utility or appearance related personalisation. The aim of utility-related personalisation its aim is to improve the functional quality, while the goal of appearance-related is solely aesthetical.
- *Personalisation Moment*: occurs when the modification occurs – before purchase, before usage, or during usage. In case of being before purchase, then it is during a co-design process.

- *Deliberateness:* when the personalisation or modification is not on purpose but instead unintentional through the usage of the product.

Computer-led co-design experience focuses on *Mental Effort* and *Flexibility* dimensions as well as the advantages and risk of process and product presented by Thallmaier (2015) to develop the computer-based interfaces (section 2.3.4) and analyse their impact towards the elicitation of Emotional Experience during the design of woven textile.

2.3.8. SUMMARY

The review of co-design literature has identified the computer-led co-design experience method as the most suitable for the practice element of this research. It combines elements of web-based co-design and in-store co-design, which provide a computer-led tool for co-design. This literature review has also identified the elements required for the analysis of computer-based interfaces: preference fit, uniqueness, self-expression, uncertainty, enjoyment, creative achievement, pride of authorship, mass-confusion, time effort, mental effort, flexibility, perceived value and co-design experience.

2.4. CONCLUSION

The literature review has covered three areas: Emotional Experience, digital coding within textile practice, and co-design. The review of current debates on Emotional Experience has led to the creation of a framework – the *Emotional Experience three-domain framework* – which is applied during the categorisation of participants' responses to the sensory perception of woven textiles. The review has contextualised weaving practice that incorporates digital coding as a design tool. The discussion has presented three categories within which code is used in the practice of weaving. The categorisation of code is used to evaluate how digital coding affects designing with Emotional Experience within woven textiles. Finally, the review of the literature on co-design and mass-customisation processes has led to the introduction of the term computer-led co-design experience as a process for co-designing the woven textiles. By involving the participants of this research in the computer-led co-design experience, an Emotional Experience of the co-designed woven textile is elicited.

3. METHODOLOGY

The methodology explains and justifies the methods selected to approach the research question. The chapter has three sections:

- *Methodological approach: Research through practice*: outlines the research approach composed by a multi-method triangulation and the connections with the three key areas discussed during the literature review: Emotional Experience (section 2.1), digital coding within textile practice (section 2.2), and computer-led co-design experience (section 2.3).
- *Multi-method triangulation:* discusses the elements of each approach, and the use and benefits within the practice work.
- *Reliability, validity and relatability*: justifies the use of multi-method triangulation as well as data triangulation to respond to the rigour of the research findings.

3.1. METHODOLOGICAL APPROACH: RESEARCH THROUGH PRACTICE

Bruce Archer (1995), a design researcher, defines three different categories of practice-based research: *Research about Practice*, *Research for the Purpose of Practice* and *Research through Practice*. He describes *Research about Practice* as '…the analysis and criticism of the output of art or design activity…', *Research for the Purpose of Practice* as '…the investigation for the purposes of contributing to a practitioner activity is conducted according to the principles of its field, and is indeed a systematic enquiry whose goal is communicable knowledge', and

finally *Research through Practice* as '…the way to shed light on a proposition, a principle, a material, a process or a function is to attempt to construct something, or to enact something, calculated to explore, embody or test it' (Archer, 1995: 11).

Resonating with this idea, Christopher Frayling (1993), a design researcher, previously elaborated the concepts of *Research into Art and Design, Research for Art and Design,* and *Research through Art and Design.* According to Frayling (1993), *Research into Art and Design* is the most common and straightforward approach to research, being historical, aesthetic or perceptual. The end product of *Research for Art and Design* is an artifact, and the main aim is not communicable through verbal means. Finally, he states that *Research through Art and Design* is based on material research, development work or action research (section 3.2.2).

Although Frayling (1993) and Archer (1995) share similarities in both of their categories *Research through Practice* and *Research through Art and Design,* there are some differences between them. For Archer *Research through Practice* is an action research, defined as the '…systematic enquiry conducted through the medium of practical action, calculated to devise or test new, or newly imported, information, ideas, forms or procedures and generate communicable knowledge' (Archer, 1995: 11). On the other hand, Frayling defines action research as the '…practical experiments in the studio contextualised by a report…' (Frayling, 1993: 5). Archer gives more attention and definition to the action that the researcher-designer needs to conduct, while Frayling puts more emphasis on the need for reporting the practice.

Redström (2017) presents three strategies of *Research through Practice* and how both domains, theory and practice, inform the research. The *Parallels tactic* is based on keeping

the two design domains, theory and practice, independent from each other with a bridge in between for reflection. This approach adopts an existing design practice and adds a reflective layer in retrospect. The second tactic, *Sequencing*, aims to bring theory and practice together through iterative research and applying theories from other disciplines outside the domain of design, such as psychology, sociology, and philosophy. Finally, the *Intermediaries tactic* focuses on the tension between the general and particular, attempting to articulate theories at different levels of abstraction to move them closer to the practice. Following Redström's (2017) tactics definitions, this research embraced the *Sequencing tactic* to adopt theories from other disciplines such as consumer behaviour and apply them to the practice, creating an iterative methodology to bring both domains together.

To further define the methodology of this research, Muratovski (2016) posits that the use of cross-referencing can help to establish '…credible, valid, and reliable research practice' (Muratovski, 2016: 39) introducing four main categories:

- *Data triangulation*: brings together various data sources.
- *Investigator triangulation*: different researchers work together on the same problem.
- *Theory triangulation*: examines different perspectives on the same data set.
- *Methodology triangulation*: employs different ranges of methods to gather data.

To conduct this practice-based research rigorously and to ensure that it moves beyond subjective speculations, a multi-method triangulation was adopted, encompassed by design research, action research and qualitative research approaches (Figure 3.1). The design research approach provided an umbrella for the investigation as well as a design reflection method (section 3.2.1.1). The action research approach brought a framework to develop a

reflective practice and translation of tacit knowledge into explicit knowledge (section 3.2.2.1). The qualitative research approach implemented participatory research using two methods, Repertory Grid Technique and in-depth online video call interview (section 3.2.3.1); and therefore becoming a participatory practice-based research.

Figure 3. 1. Qualitative multi-method triangulation of this research.

3.1.1. PARTICIPANTS

The ontology of this research was qualitative and ten young adults aged 18-35 were chosen to be participants based on the fact that persons within this age range were digital natives at the time of this investigation. This research understood digital natives as individuals who '…communicate their identities simultaneously in the physical and digital worlds' (Palfrey & Gasser, 2008: 5). The young adults were HE students from Art, Design and Media courses at Manchester School of Art (United Kingdom). Although selecting HE students in Art, Design and Media as participants could have created limitations with regards to generalisability of data, their training and understanding of tacit knowledge helped the evaluation of the elements of this practice (Overliet & Soto, 2011; Derviş, 2021). As students at Manchester School of Art are encouraged to develop their creativity and decision-making skills and have multidisciplinary collaborations through their programmes' curricula (Manchester School of Art website, 2021), their feedback helped to test the method computer-led co-design experience. This benefited the research:

- By participants being more familiar with design terms.
- By participants feeling more comfortable on challenging current ways of making.
- By participants presenting a critical view of the process while collaborating with the research.

In order to select the participants, various factors were considered. Sonja Andrew's (2008) paper explores several areas of existing theory and research to consider a communication-based reading of textiles, which informs this research. While Barthes (1990) suggests that the

meaning of textiles may differ between groups, and multiple meanings can be generated, Lurie (1992) discusses gender signification and the textiles' non-verbal communication that might be acquired. *Meaning* could be understood as the transmission and expression of concepts created between the maker and the audience through the use of textiles (or objects). This research suggests that if *meaning* differs from gender and groups, these factors also have influence on the Emotional Experience of textiles. Andrew (2008) claims that responses to many fabrics are not inherent but *culturally learned*. Following Barthes' (1990) and Andrew's (2008) studies, this research focused on one group with similar design backgrounds (Appendix A).

Another factor under consideration at the time of selecting the group of participants was language. Fenko et al. (2010) indicated that language is one of the core components of any culture, but the authors fail in giving a definition of culture. Therefore, this research used McCraken's (1986) definition of culture, who described it as the *lens* through which the person views phenomena, with their reaction to it being the *blueprint* of human activity.

The natural learning of languages is a complex cognitive task and the major pressure for brain evolution in our species (Byrne & Whiten, 1988 in Fenko et al., 2010). It could be considered that language is central to communication and closely related to thoughts. As individuals communicate their thoughts in different languages, categories and distinctions of each languages determine a way of perceiving, analysing and acting in the world. For instance, grammatical gender can influence product experience (Boroditsky, 2001). Borodistky's (2001) study identifies differences between German and Spanish speakers when describing objects like *key* or *bridge*. German speakers tend to use more adjectives traditionally related to masculinity at the time to describe *key*, while Spanish speakers are more likely to use

adjectives that traditionally have been associated with femininity. On the contrary, Spanish speakers use adjectives such as *big*, *strong* or *dangerous* to describe a *bridge*, while German speakers tend to use words like *elegant*, *fragile* and *peaceful*. This differentiation is due to the opposite grammatical gender of the word in these two languages. Although, Boroditsky (2001) claims that language has an important influence on thinking, other views have reported evidence to the contrary (Li & Gleitman, 2002). Whorf (1956), Schmitt et al. (1994) and Fenko et al. (2010) note that structural differences between languages affect mental representations, which influences individual memory of verbal information. As sensory descriptors of Emotional Experience can contain significant language differences depending on the domain of the languages (Fenko et al., 2010), the two pilot studies conducted during this research evaluated whether language would affect the research outcomes (Appendix B). The feedback from the volunteers of the pilot studies was that English as a second language created a barrier at the time to communicate their Emotional Experience. Therefore, based on volunteers' feedback and the research of Whorf (1956), Schmitt et al. (1994) and Fenko et al. (2010), the participants of this research were selected from people that had the same mother tongue in which the interviews were run (English).

During the research two participants withdrew from the investigation due to mental health issues and moving overseas. Initially the aim was to substitute both participants, however, as it was during stage three of the practice and the nature of handweaving discipline is slow, a decision was made to not substitute the participants.

3.1.2. ETHICAL IMPLICATIONS

As the research involved individuals directly (interviews) and their design participation (co-designed textile using computer-led co-design experience), an ethical approval was required. In February 2018 the research was submitted to the Arts & Humanities Research Ethics and Governance Committee for ethical approval and was accepted. Written permission was obtained from all participants to video record the interviews. The participants had an initial one-to-one meeting with me to be given the structure and aim of overall research and the objectives of each interview in advance. Moreover the participants were informed that if they chose at any time to withdraw from the study all data would be deleted. All data gathered was password protected; when presented in the main body of work as well as in the Appendix all participants' identities were coded.

3.2. MUTLI-METHOD TRIANGULATION

The use of multi-method triangulation combined with the nature of practice-based research – where tacit knowledge can lead to new discoveries (Stephens, 2018) – provided this investigation with a flexibility of process to ensure its rigour (Pailthorpe, 2017). The flexibility of the research built on the development and adaptation of the practice's elements, which were based on the participants' responses and my expertise in weaving.

In order to conduct the practice, each of the three methods of the triangulation responded to one of the key areas of this research's literature and responding to the research's

objectives. Design reflection provided the tools for computer-led co-design experience ideation. Reflective practice focused on the process of reflecting on the use of digital coding in the weaving design process. Finally, participatory research allowed the research to capture participants' Emotional Experience towards the process and final outcome. Figure 3.2. shows the practice investigation's timeline, the stages in which the practice is conducted, and the implementation of the multi-method triangulation. To test the qualitative multi-method triangulation approach within the practice investigation, the research conducted two pilot studies with a set of volunteers. The volunteers[23] provided feedback at each stage of the research and their interactions were observed. Findings were used to adapt the multi-method triangulation so that it achieved the objectives of the research.

The first pilot study was conducted prior to the main investigation and centred on selecting the woven textile samples and planning the RGT interviews for Stage One of the practice investigation (Appendix B). The second pilot study also informed Stage One by providing the order that the 12 woven textile samples would be presented in. During and after this pilot study a collaboration with a computer engineer was carried out to develop four computer-based interfaces (Stage Two). The second pilot study also informed the first half of Stage Three. The three stages of the practice investigation followed the structure planned during the pilot studies. To finalise the practice, a collaboration with TextielLab enabled the

[23] The volunteers were not involved in the main practice investigation; therefore they were not considered participants. The first pilot study presented two volunteers and the second pilot study three volunteers.

production of the final co-designed textiles. Chapter Four discusses the practice with further detail and discussion.

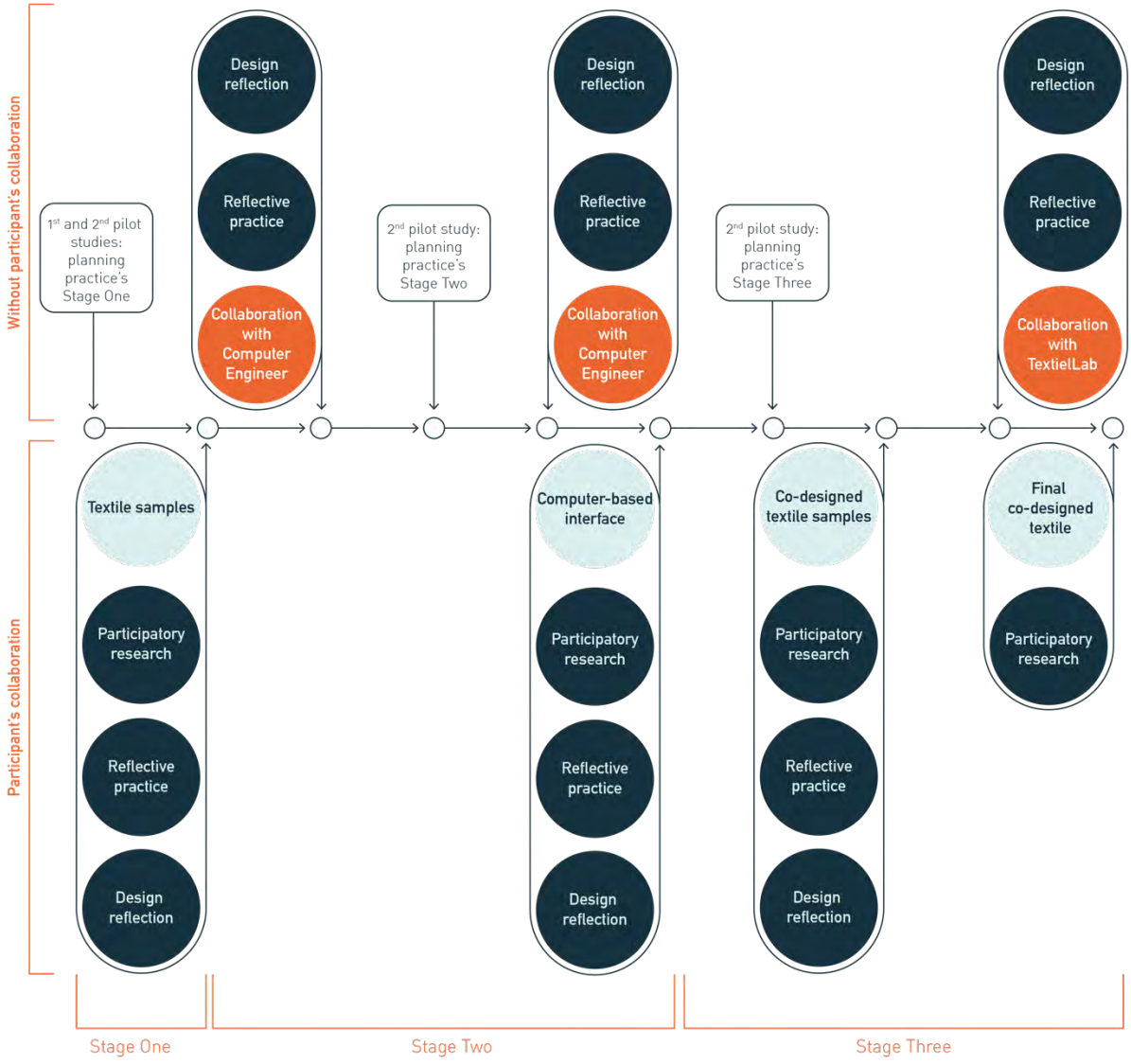


Figure 3. 2. Practice's timeline and the implementation of the multi-method triangulation in each phase of the practice.

3.2.1. DESIGN RESEARCH APPROACH

Following Fryling's (1993), Archer's (1995) and Redström's (2017) categorisations of practice-based research, this section provides the framework of design research this study adopted. Because of the fluidity of the design process, it has at times been misunderstood and confused with design research. As Suri (2008) points out for some people design research is data collection, for others it is the required stage before coming up with ideas. To establish and create the foundation of design research, a number of attempts have been made to classify design research (Frayling, 1993; Cross, 1999; Laurel, 2003). For instance, Laurel (2003), a researcher in digital creative industries, defines design research as a place to weave together theory and practice to make the work stronger. Nigel Cross (1999; 2001), a design researcher, gives design research an intellectual independence away from science and art, however, it must match the standards and rigours of science and art research. In line with Cross's idea, this research used a design reflection method to respond to different conditions and requirements for the practice, providing tools for rigorous ideation, documentation and reflection of design elements.

3.2.1.1. DESIGN REFLECTION TOOLS WITHIN THE RESEARCH PRACTICE

Newman (2010) drew the design squiggle, an illustration of the design process, which represents the journey of designing from research and synthesis to the final design (Figure 3.3).

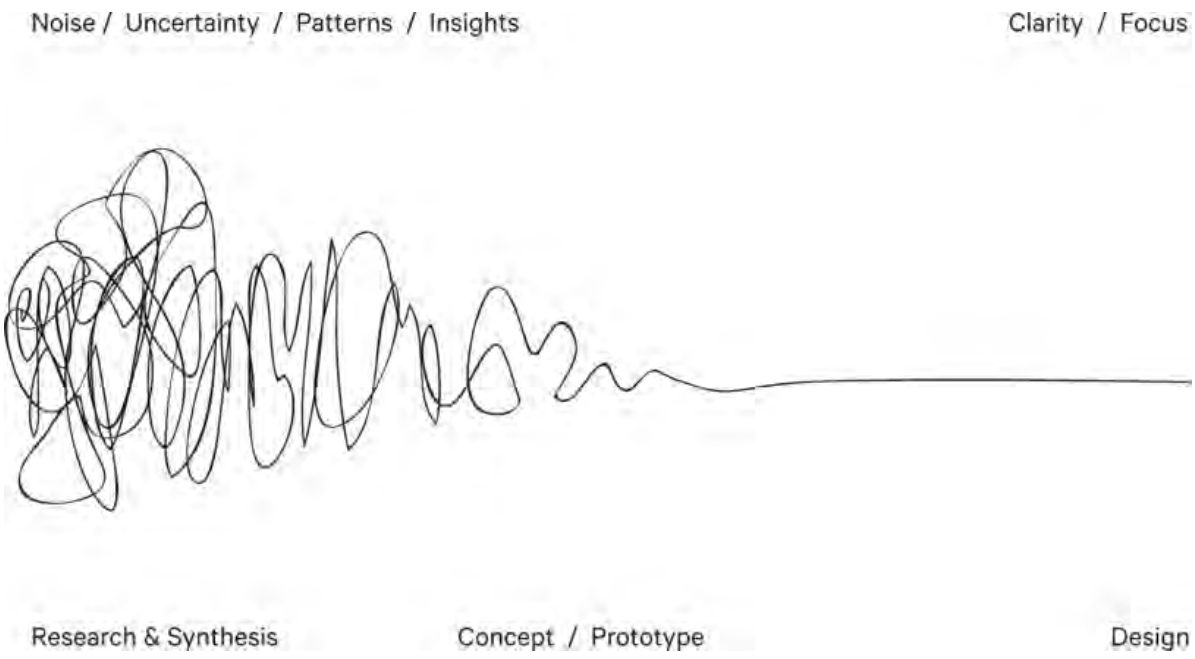


Figure 3. 3. Newman's (2010) design squiggle.

Although Newman created this illustration whilst having in mind the process of designing for desktop software, this graphic shares similarities with the textile design process (Stephens, 2018). Figure 3.4 shows the design tools that were taken to conduct the design practice of this research based on Newman's design squiggle.

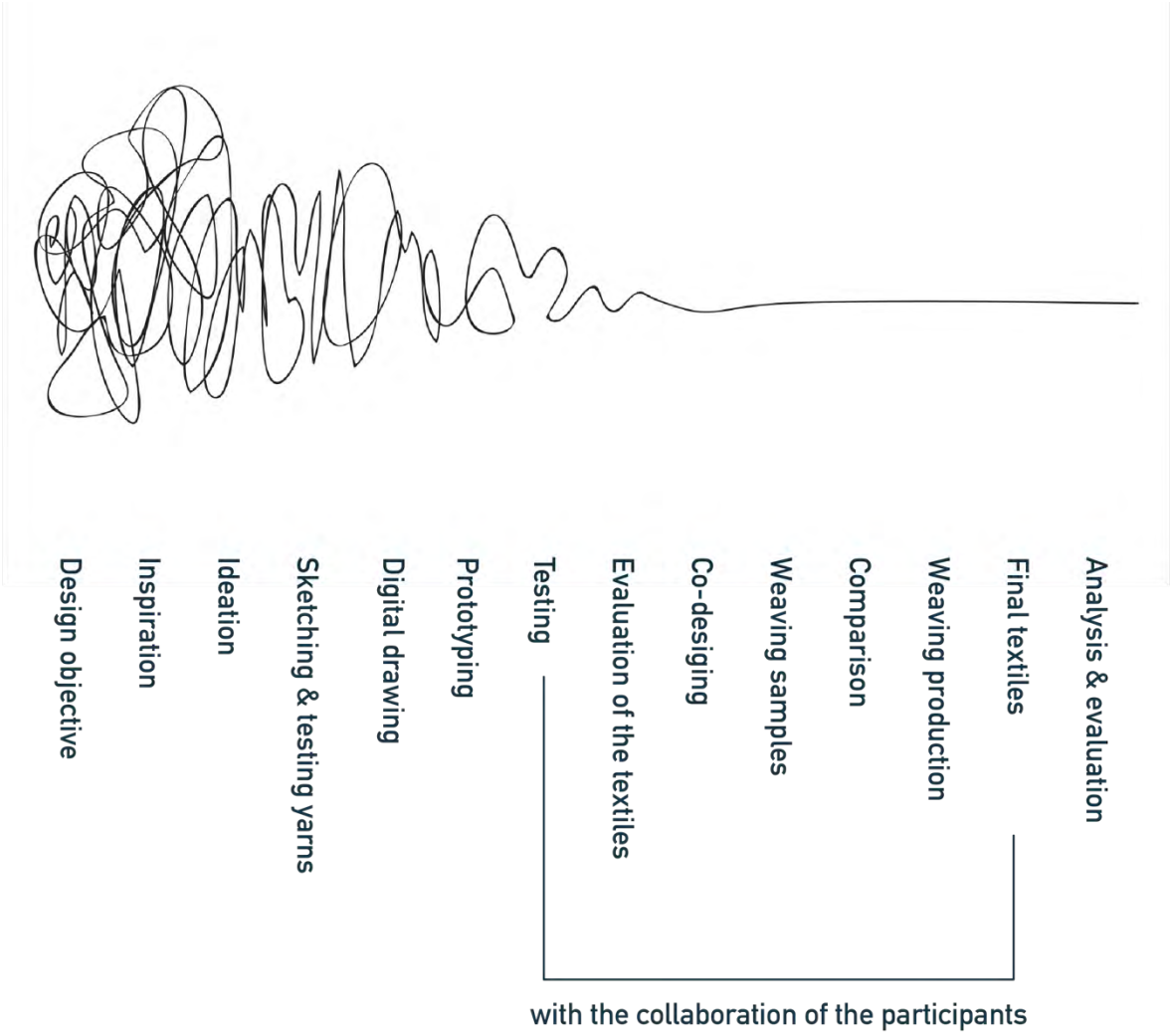


Figure 3. 4. Adaptation of Newman's (2010) design squiggle.

Each tool of the design process provided a reflection space to evolve and inform the practice. As shown in the graphic, the design process was not lineal and therefore the practice adopted an iterative process of moving back and forth between stages of the textile design practice (Figure 3.5). The reflection spaces were areas to reflect on the use of tacit knowledge during the practice and convert it into explicit knowledge.

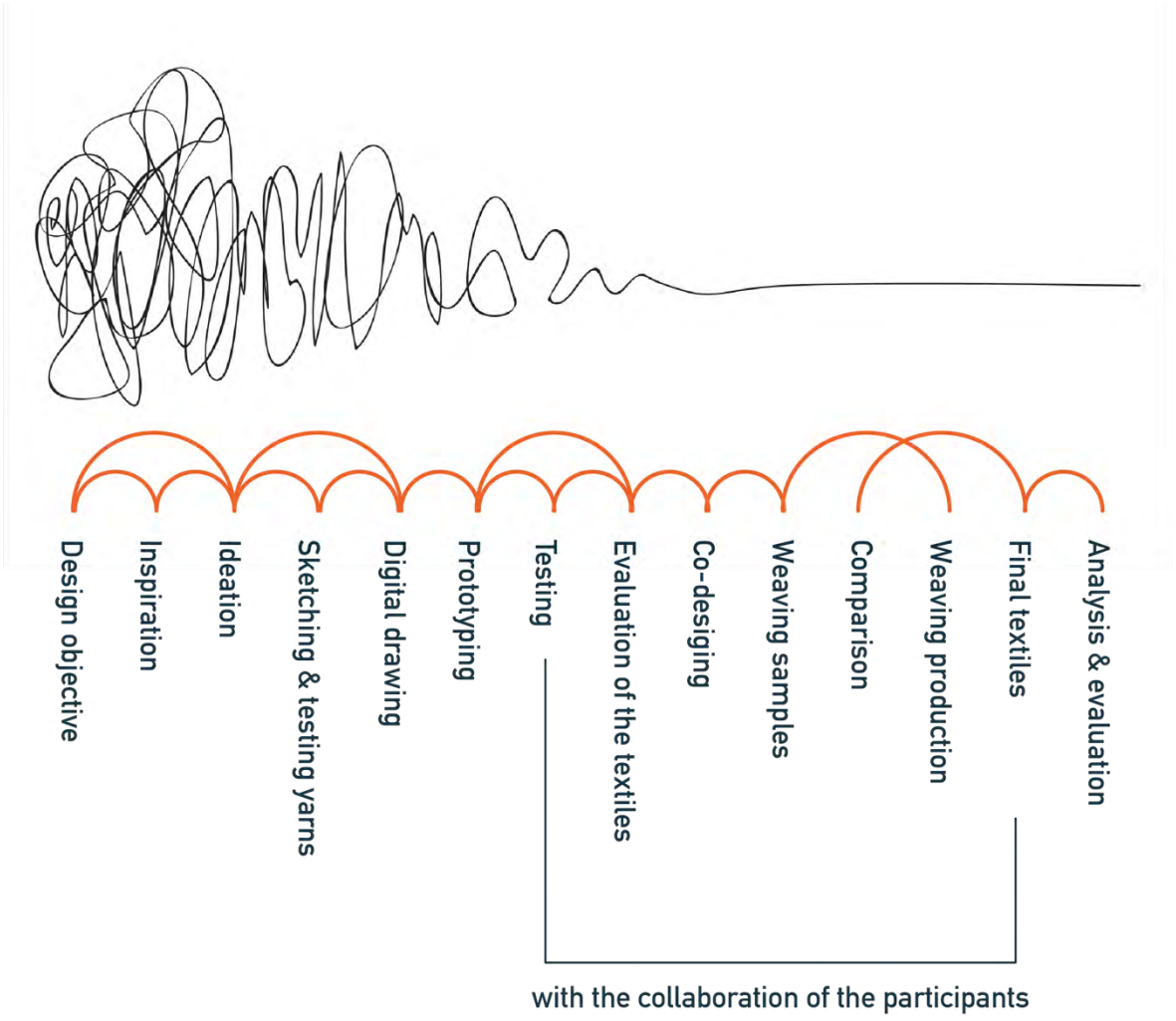


Figure 3. 5. Iteration of the design process based on Newman's (2010) design squiggle.

3.2.2. ACTION RESEARCH

Warpas (2013) states that action research is mostly applied to *hands on*, small scale studies aiming to introduce a solution to a practical problem and add to the body of knowledge of a particular field. Argyris & Schön (1991) bring a detailed definition of action research when saying that:

> action research takes its cues – its questions, puzzles, and problems – from the perceptions of practitioners within particular, local practice contexts. It bounds episodes of research according to the boundaries of the local context. It builds descriptions and theories within the practice context itself, and tests them there through intervention experiments – that is, through experiments that bear the double burden of testing hypotheses and affecting some (putatively) desirable change in the situation (Argyris & Schön, 1991: 86).

As this was a small-scale practice-based enquiry arising from a particular practice context (the use of digital coding within the weaving practice) with a specific problem (elicitation of Emotional Experience), it regarded action research as a suitable approach for the qualitative multi-method triangulation. Rasmussen (2004) distinguishes three features shared among all action research methods:

- Involvement of the research subjects as co-inquirers, creating a participatory approach where both parts work closely together.
- Findings originated not only on strictly formalised rules but also included heuristic methods, dialogues, and actions taking place during the process.
- The facilitator acquiring a multi-role such as researcher or designer.

Action research benefited this investigation by addressing a specific situation with the participants of this research, allowing the shared space to create new insights and advance

the practice (Archer, 1995). Finally, in this research I adopted a dual role of the designer-researcher. As researcher I brought knowledge of the research context and the intellectual framework to the investigation, and as designer, I brought knowledge of weaving practice and its embedded tacit knowledge (Burns, 1994; McKay & Marshall, 2001).

Action research can present challenges for the investigation, for example the self-involvement of the researcher in the research can cause bias and affect the findings if there is not a methodological consistency in place. Although this practice-based research acknowledged the subjectivity of the researcher presented during the practice of the research, it aimed to apply a criteria of rigour (Rasmussen, 2004) to avoid any bias. Herr & Anderson (2005) introduce *Outcome validity* to refer to the achievement of action-oriented outcomes. Outcome validity acknowledges the need to reframe the problem in a complex way, offering new sets of questions and problems; and creating an iterative and spiralling dynamic of inquiry, thus, Outcome validity is dependent on *Process validity*. Process validity 'asks to what extent problems are framed and solved in a manner that permits ongoing learning of the individual or system' (Herr & Anderson, 2005: 7). The outcomes reflect the process of investigation, which presents a process of reflection to include iteration and re-examination of the underlying assumptions behind the inquiry. As mentioned in section 3.1, this participatory practice-based enquiry had a flexibility of process, which introduced spaces of reflection to validate the outcomes and process.

3.2.2.1. FROM TACIT KNOWLEDGE TO EXPLICIT KNOWLEDGE

In the 1960s, the philosopher Michael Polanyi was the first to coin the term tacit knowledge describing it by saying '…we can know more than we can tell' (Polanyi 1983: 4). Based on Polanyi's definition, Crouch & Pearce (2016) define tacit knowledge as the '…sets of information and practices that we call upon unconsciously but cannot fully articulate' (Crouch & Pearce, 2016: 38). They reinforce the idea that to create a body of knowledge based on tacit knowledge, the researcher must make it explicit so that the future research community can build and develop on it.

Dormer (1994) identifies the use of tacit knowledge in craft and textile design, however he uses the term *taciturn*. *Taciturn* refers to a practitioner that cannot fully articulate their knowledge through spoken or written form, and instead communicates visually or physically (Dormer, 1994). Dormer reaffirms Albers's (1965) idea when she states that tacit knowledge can bring outcomes that can validate it.

Tacit knowledge is embedded in the action of making, where the knowledge of the discipline is embodied within its own domain, and therefore craft culture has traditionally been associated with tacit knowledge (Dormer, 1994; Kettley et al., 2010; Stephens, 2018). Gale & Kaur (2002) contend that the validation of textile practice research has been met with challenges due to its inability to explain textile knowledge. This is due to traditional textile training being grounded in making, where less emphasis is put on the documentation of the thinking process. This way of teaching leads practitioners to subconsciously make decisions at the design phase that cannot verbally be explained later (Dormer, 1994; Frayling, 2011). Alison Shreeves (1998), an art researcher, identifies these subconscious decisions as being

relevant because they contain the values of tacit knowledge, thinking and implicit learning. This investigation considered tacit knowledge to play an essential role in achieving the best results in the research and practice. To this end, my area of expertise in weaving informed the selection of yarns and weave structure, and the analysis of technical aspects of the textile samples. The decisions taken during the weaving process reflected and informed the research outcomes. Niedderer (2007) affirms that:

> tacit knowledge seems important for the generation and application as well as the experience and judgement of research and its results, and for creating new experiences, abilities, and knowledge. (Niedderer, 2007: 6)

While Dormer (1994) and Frayling (2011) mention the difficulties of transferring tacit knowledge into explicit knowledge, Crouch & Pearce (2016) point out that practice has both tacit and explicit knowledges and it is the researcher's job to unravel both. By clarifying and rationalising the tacit knowledge it can transform into explicit knowledge, where it is considered more reliable (Thompson, S. & Thompson, N., 2008).

Explicit knowledge refers to the explicit awareness of the practitioner and it is an intrinsic part of the reflective practice. It refers to the conscious awareness of knowledge that the practitioner puts into action. Thompson, S. & Thompson, N. (2008) refer to explicit knowledge as open, while implicit knowledge is closed. Implicit knowledge draws on the implicitly of actions and has no direct awareness of them. With implicit knowledge the practitioner is not aware of how knowledge has been acquired or what it is. Implicit knowledge is frequently linked to tacit knowledge as it cannot always be justified. Instead, for validation of research, explicit knowledge is required.

To translate and validate the tacit knowledge embedded in this research, an iterative process of reflection of the practice during the design phase of woven textiles and computer-based interfaces was adopted. The design reflective tools (notetaking, sketching, prototyping and testing) allowed the practice investigation to produce a recording of the ideas developed in each stage, while the reflective spaces provided the time to make comparisons and connections, while analysing and evaluating in relation to the literature research.

3.2.2.2. REFLECTIVE PRACTICE

In 1983 Donald Schön published *The Reflective Practitioner: How Professionals Think in Action*. Schön discusses ways in which reflection, action and knowledge are woven together. He proposes a new model of professional knowledge based on reflective practice. Reflective practice is 'the interrogation of thoughts and action within a specific context' (Candy, 2006: 14). The importance of his theorisation of practice is the distinction between *reflection on practice* and *reflection in practice*. *Reflection on practice* refers to the reflection after the practitioner has finished a task. *Reflection in practice* requires the ability to think about *making* during the process. Both processes require critical thinking and evaluation. *Reflecting on* and *in* the action of making produces new knowledge and novel outcomes. By an iterative trial and error process, the practitioner acquires new perspectives on previously learnt skills. S. Thompson & N. Thompson (2008) affirm that over time this iterative learning process makes the practice more valuable and focused for the researcher. Another important factor in the iterative learning process of textile design is, as Stephens (2018) points out, the mistakes and unexpected results that can have an impact on creating new knowledge through

experiential learning. She states that a key component of experiential learning is the tacit knowledge that the practitioner acquires over time. The presence of this tacit knowledge in the design practice benefits the research as it creates new unexpected outputs and generates new options for the emerging design process.

In design practice the researcher iteratively reflects on and in the practice at different phases of the research. Through a process of trial and error, new experiential learning creates tacit knowledge. Thus, the methodological framework used in this research transformed the tacit knowledge into explicit knowledge in order to inform the current design literature (Figure 3.6).

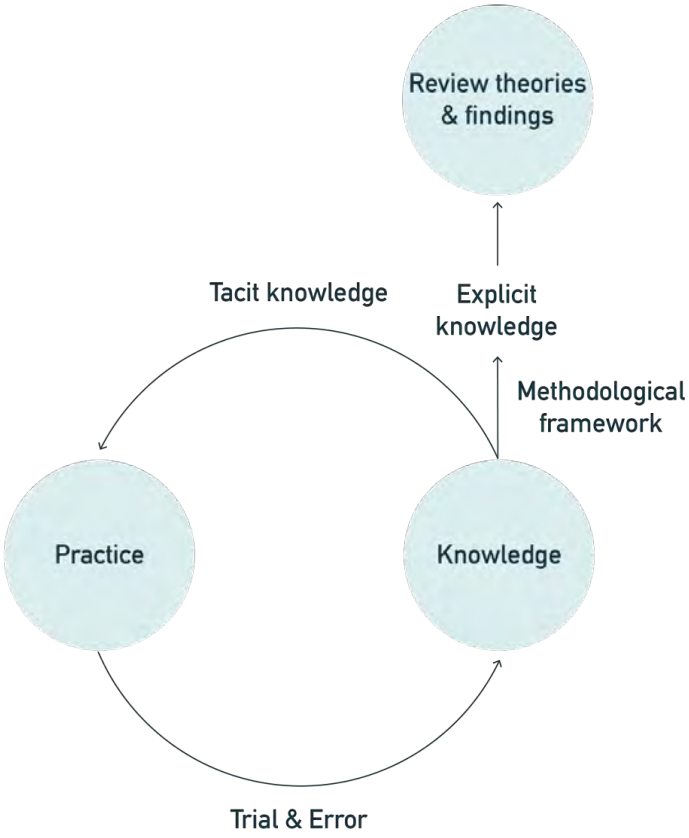


Figure 3. 6. Reflective practice process in this research.

3.2.2.3. PRAXIS

The concept of praxis '…outlines the combination of theory and practice and the interlaced relationship between the two' (S. Thompson, & N. Thompson, 2008: 22). Muratovski (2016) shows how praxis relates to reflective practice. He points out that while there exists two ways of applying reflective practice, only one relates to praxis. For instance, using the hypothetical scenarios where one looks at a chair as an object and one looks at the action of sitting, praxis relates to the second scenario where action and thinking work together, allowing the researcher to ask questions about the purpose of theory in action. Praxis was an intrinsic part of this research due to theory and practice being in constant reflective dialogue during the investigation. Therefore the praxis focussed not on the textile itself but rather on the computer-led co-design experience of woven textiles to elicit Emotional Experience.

3.2.3. QUALITATIVE RESEARCH APPROACH

The last approach of the multi-method triangulation was a qualitative research approach. This refers to the exploration and construction of a deeper, more meaningful picture of the individuals' experience and vision of the world (Given, 2008; Muratovski, 2016). The research used participatory research methods, the Repertory Grid Technique (RGT) and in-depth online video call interview, to gather data and insights.

3.2.3.1. THE REPERTORY GRID TECHNIQUE

The RGT is a highly structured interview method which is centred around the interviewee's own words and construction of the world. It was created by George A. Kelly (1955), an American psychologist, therapist, educator and personality theorist, to elicit constructs when investigating patients' personal relationships and situations in life under the umbrella of Personal Construct Theory. Kelly introduced the idea that all individuals are experts in matters concerning themselves, acting on the basis of specific expectations (Baber, 1996; Bang, 2007).

Personal Construct theory is based on the development of individuals' personal theories about the world. In order to understand their environments, individuals act as personal scientists (Shaw, 1980; Zuber-Skerritt & Roche, 2004). By acting as scientists, individuals can construct their behaviour and anticipate future events. The RGT bi-polar construct refers to the anticipation and explanation of events in people's world through organisation of perceptions. People uses the RGT bi-polar constructs to test their hypotheses, which are the basis of personal theories. These RGT bi-polar constructs are revised when experience suggests the need for further thought. While creating these RGT bi-polar constructs, people are acting as constructors of knowledge.

The RGT requires the researcher's objectives to be determined during the general planning phase among other decisions that might affect the capture of data. Thus, it requires a good knowledge and understanding of how the RGT is conducted and analysed. Figure 3.7 shows the components of the RGT. The RGT consists of:

- The *RGT topic* of the interview: should represent the researcher's objectives and determines what the interview is about.
- The *RGT elements:* represents the content area under study and illustrate the topic. The elements can be preselected by the researcher or created by the interviewee.
- A *set of personal RGT constructs:* are created by the interviewee to compare and contrast the elements or presented by the researcher. The personal construct is the most important component of the RGT due to it describing what the interviewee thinks about the topic. The personal constructs are presented as personal RGT bi-polar constructs, where every statement is presented as opposite ends of the pole. Zuber-Skerrit & Roche (2004) state that RGT bi-polar constructs might have a clear opposition, but it is not a necessary requirement of RGT bi-polar constructs. What influences the participant's perception is not only the attributes of elements being compared, but also how the participant understands the construct labels (Zuber-Skerrit & Roche, 2004: 85).
- The *RGT rating system*: evaluates each element based on the RGT bi-polar constructs, is usually a rating scale based on 1-5 (Feixas & Cornejo, 1996).

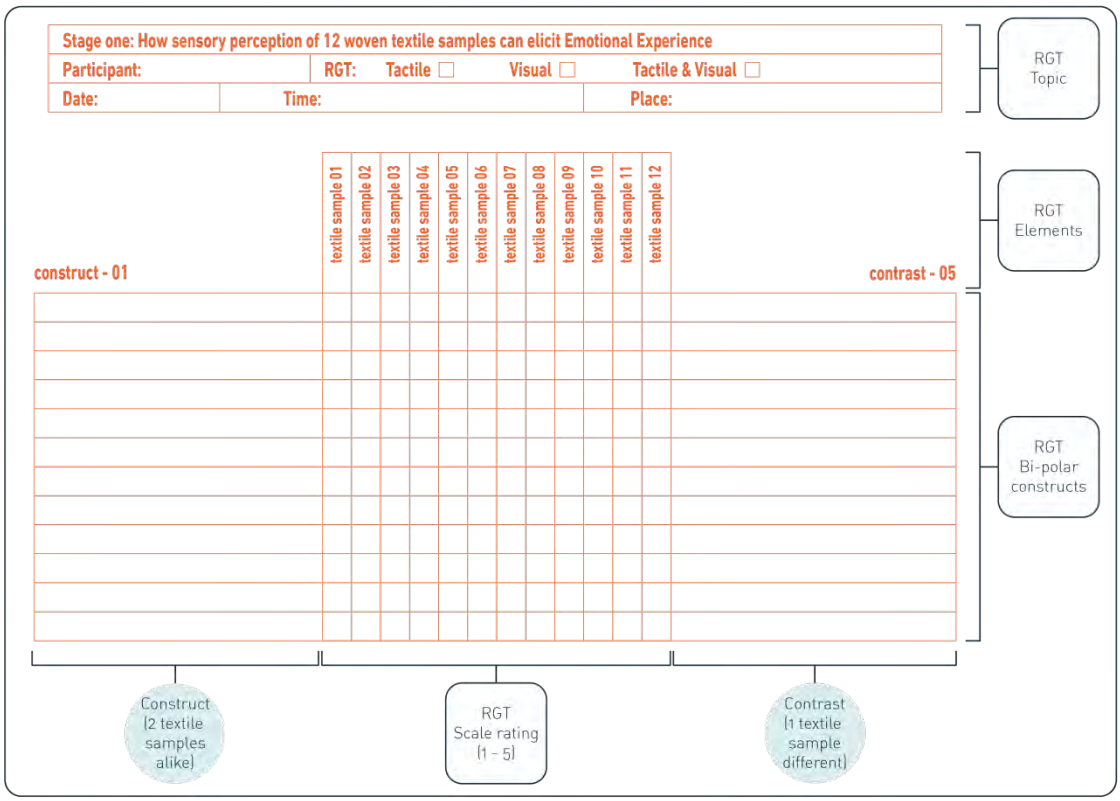


Figure 3. 7. Repertory Grid Technique interview sheet for practice's stage one of this research.

The RGT is not postulated to the researcher's theoretical construct, rather, it can be more accurately described as a personal-centred approach because it involves the study of an individual's own theory and personal construct (Feixas, 1989) through interviews. The RGT has been used in a wide range of contexts because of its ability to capture data, e.g. human resources (Dick & Jankowicz, 2001), textile design (Bang, 2010) and consumer behaviour (Rocchi & Stefani, 2006). This technique can be a rich source of qualitative data as it allows people to express themselves in their own terms. Yet, the RGT combines qualitative and quantitative methodologies and can be analysed statistically because of the use of a rating scale.

Dick & Jankowicz (2001) point out that the method avoids the use of priori categories, but since the interviewees are asked to elicit the same phenomena, it is systematic enough to articulate common cognitions of the same topic. They posit that the RGT also allows interviewees to express their vision of the phenomena by using their words, yet, because of its systematic nature, the interviewee's responses can provide intelligible data to be analysed quantitatively and qualitatively. Finally, the data gathered from the RGT is rich enough to make a qualitative analysis of each interviewee's construct system, and at the same time, is sufficiently parsimonious to enable rigorous content analysis that can be checked for reliability.

3.2.3.1.1. REPERTORY GRID TECHNIQUE WITHIN DESIGN RESEARCH

Moody et al. (2001), Bang (2010) and Derviş (2021) use RGT to evaluate material-personal relationships, and each researcher adapted and modified it for their own projects. Moody et al. (2001) explore how *Sensory Evaluation* (touch and vision) of garment fabric can be expressed verbally; Bang (2007) evaluates how to operationalise the term *Emotional Value of Applied Textiles* by developing participatory procedures; and Derviş (2021) explores sensory and attitudinal approaches of individuals towards perceived material properties in product context. This research perceives the RGT similar to Moody at al. (2001) and Derviş (2021), where they focus on analysing and interpreting the results of the RGT, instead of using the RGT as a tool for dialog (Bang, 2007). Due to its adaptability RGT presents three different modalities to achieve the objectives of this research. Firstly, during the sensory perception of

woven textiles the participants of this research created RGT bi-polar constructs; it allowed the participants to conceptualise their RGT bi-polar constructs using their own words. Secondly, during the computer-led co-design experience the RGT bi-polar constructs were created to connect participants' responses to Thallmaier's (2015) research. Thirdly, a combination of participants' sets of RGT bi-polar constructs alongside my own as designer-researcher were used to analyse the co-designed textile samples to reflect on the sensory perception and computer-led co-design experience. Chapter Four presents a detailed structure regarding the adaptation of RGT in each stage of the practice.

3.2.3.2. IN-DEPTH ONLINE VIDEO CALL INTERVIEW

Using a qualitative approach within this research provided a space for necessary adaptation by accommodating the changes in data collection and analysis during the last stage of the practice (section 4.2.3.3). The multi-method triangulation was adapted due to COVID-19 restrictions and incorporated an in-depth online video call interview via Zoom[24] which utilised a qualitative method approach, and substituted the last in-person RGT interview. The

[24] Zoom (Yuan, 2011) meeting provides a free 40-minute videotelephony and online chat services through a cloud-based peer-to-peer software.

participants of this research were familiar with Zoom due to the university initially adopting the software to conduct online lectures during the first COVID-19 lockdown in March 2020.

The interview was semi-structured, consisting of a relaxed, honest and open discussion of mutual interest between researcher and participant (Mason, 1998; Morris, 2018). I adopted a semi-structured in-depth interview approach to reflect on the whole computer-led co-design experience and register participants' responses to elements of the practice. Thus, the open-ended questions were divided into the following categories: sensory perception, computer-led co-design experience, and digital coding (section 4.2.3.4).

Although face-to-face interviews are preferable so that the researcher can have greater insight into body language, online video calls can provide similar benefits (Morris, 2018). Hanna (2012) points out that online video calls can have almost the same advantages as face-to-face interviews as they provide an intimate medium, where the non-verbal communication can be perceived by the interviewer. The ability to guide participants during the analysis of the final co-designed textile at the same time as perceiving non-verbal communication such as the handlining and analysis of the textile were important aspects of the interview.

A further benefit was that the interview was conducted using software, providing the ability for it to be recorded directly into the computer. However, the main problem of using Zoom to conduct the interview was that technical issues could arise, such as a bad internet connection. To overcome this, I planned and made tests with participants in advance to make sure that both internet connections could support the requirements for the Zoom meeting.

The in-depth online video call interview complemented the RGT interviews by providing a place for discussion where both parts, designer-researcher and participant, could discuss and reflect on the previous encounters during the sensory perception analysis, computer-led co-design experience and final co-designed textile.

3.3. RELIABILITY, VALIDITY AND RELATABILITY

In establishing the research's methodology, issues of reliability and validity required clear definition and boundaries. This research was based within the discipline of design research and therefore the design and research processes were integral parts of the investigation and practice. It strived to gain information and new insights underpinned by academic discourse from a small-scale sample, instead of creating a generalised body of knowledge.

The impact of the findings depended on my skills in the role as designer-researcher to conduct the interviews and run the practice, as well as the honesty of participants and their willingness to engage with the research. The data and insights gathered from the qualitative method approaches about textiles and computer-led co-design experience were therefore subjective and not objective. The subjective nature of the research was recognised and welcomed. The qualitative multi-method triangulation validated the use of my tacit knowledge as designer-researcher because it provided tools for reflection and translation, which became a legitimate and intrinsic part of the design process at the time of designing the woven textiles and computer-based interfaces (Gray & Malins, 2004). The outcomes of the research could be utilised and evaluated by other research with similar circumstances.

As the research adopted a multi-method triangulation the data was gathered from different approaches, where each approach presented different methods of collecting and evaluating data; thus, creating a data triangulation. The research overlayed and compared (i) the participants' responses to sensory perception of woven textile samples, interaction with computer-based interfaces, computer-led co-design experience, and final perception of the co-designed textile by registering the tacit knowledge via sketchbooks and notetaking; (ii) participants' reactions to elements of analysis with RGT interviews and an in-depth online video call interview; (iii) and having an iterative practice of trial and error to design the computer-led co-design experience. Through this comparison and the flexibility of practice-based research, it validated the outcomes and process.

3.4. CONCLUSIONS

This chapter has described the multi-method triangulation composed of design research, action research and qualitative research approaches, where each approach has presented its own data triangulation. Each approach of the multi-method triangulation responded to one of the key areas of this research's literature (Figure 3.8). The triangulation strengthened the validity of the research findings; acknowledging but also compensating for the subjectivity involved during my involvement in the design phases of the woven textile samples and computer-based interfaces. The qualitative approach facilitated a space for adaptability from the initial proposed method during COVID-19 restrictions, allowing the participants to be interviewed online instead of in-person. The next chapter presents the applications of each approach within the practice.

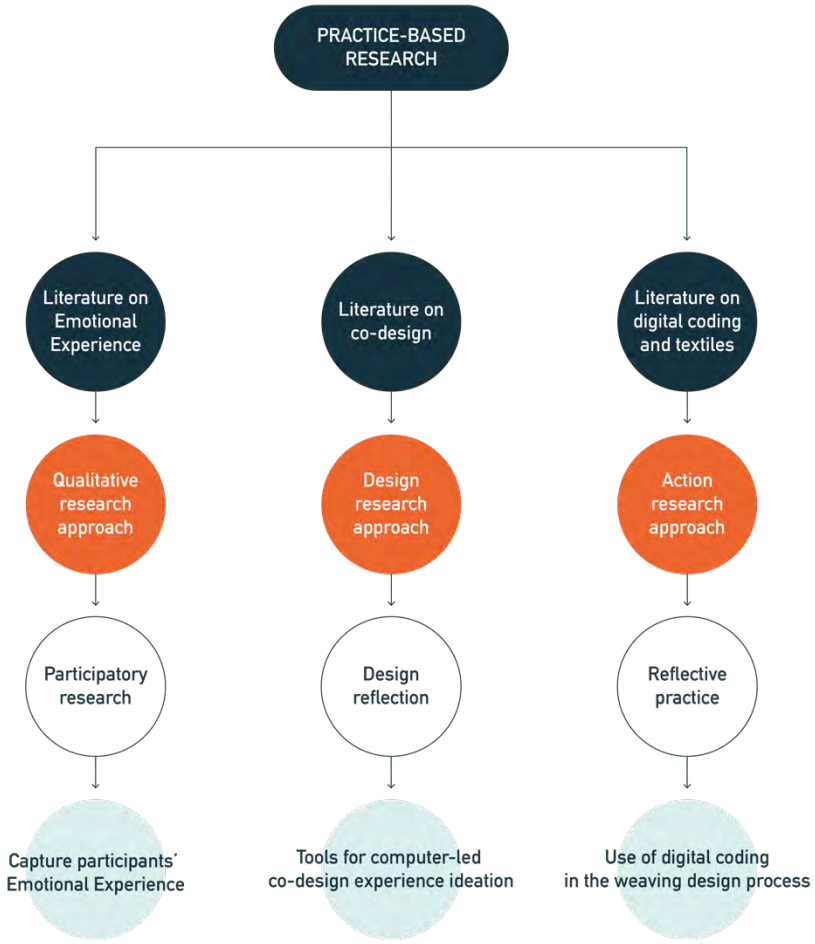


Figure 3. 8. Connection of multi-method triangulation to key areas of research's literature review.

4. RESEARCH PRACTICE

This chapter presents the textile samples and computer-based interfaces developments as well as a description of the stages that comprise the practice work. The purpose of the practical investigation was to develop a computer-led co-design experience which drew upon the participant's Emotional Experience when designing digital Jacquard woven textiles.

Before conducting the co-design investigation, two pilot studies were conducted to evaluate and inform the set-up of the practical investigation and the multi-method triangulation (Appendix B). As a result of the pilot studies, the co-design investigation was divided into three stages; methods, components, and process. These are discussed in the following two sections:

- *Application of multi-method triangulation in the practice*: presents the use of the multi-method triangulation within the participatory practice to determine the application of each method as a tool to conduct and analyse the practice.
- *Practice overview*: describes the three stages of the research practice – sensory perception, computer-led co-design experience, and computer-led co-design experience process & outcome – where the evidence and insights of each stage built the continuity of the practice. It looks at the selection of textile samples for sensory perception analysis, the design of the computer-based interfaces, and the weaving with code to present the rationale behind each element of analysis.

4.1. APPLICATION OF MULTI-METHOD TRIANGULATION IN THE PRACTICE

This section defines how the multi-method triangulation – action research, design research and qualitative research approaches – was implemented in the participatory practice. The action research approach provided a base for the practice development to offer myself as designer-researcher a place for reflective practice as well as a space for reflection during each stage's analysis, concurrently using the spaces created to transform tacit knowledge into explicit knowledge at the point of designing the woven textiles. Under the umbrella of the design research approach, design reflection provided tools such as computer-led images, notetaking, sketching or prototyping to capture the different possibilities of making. The tools brought the ability to think and reflect during making as well as a co-design mindset into the participatory practice. The participatory research introduced two techniques, Repertory Grid Technique and in-depth online video call interview, to gather participants' responses under the qualitative approach. Each stage of the practice consisted of a series of RGT interviews, where the spaces for reflection were imbued in the RGT interviews. Based on Bang (2007)[25] and the pilot studies conducted for this investigation, the research was designed so that RGT interviews were conducted to include a week's break in between each interview to avoid associations from previous feedback being brought into each session. The multi-method triangulation presented the ability to go back and forth between approaches in order to build a continuity of the practice (Figure 4.1). As the participatory practice evolved, the reflective

[25] Bang (2007) conducted two RGT interviews together, where one is tactile unimodal analysis, and the other is tactile-visual bimodal analysis. She stated that the first interview influenced participants' feedback during the second interview.

practice and design reflection became part of the analysis process and therefore the reflective space brought insights and evidence to the research.

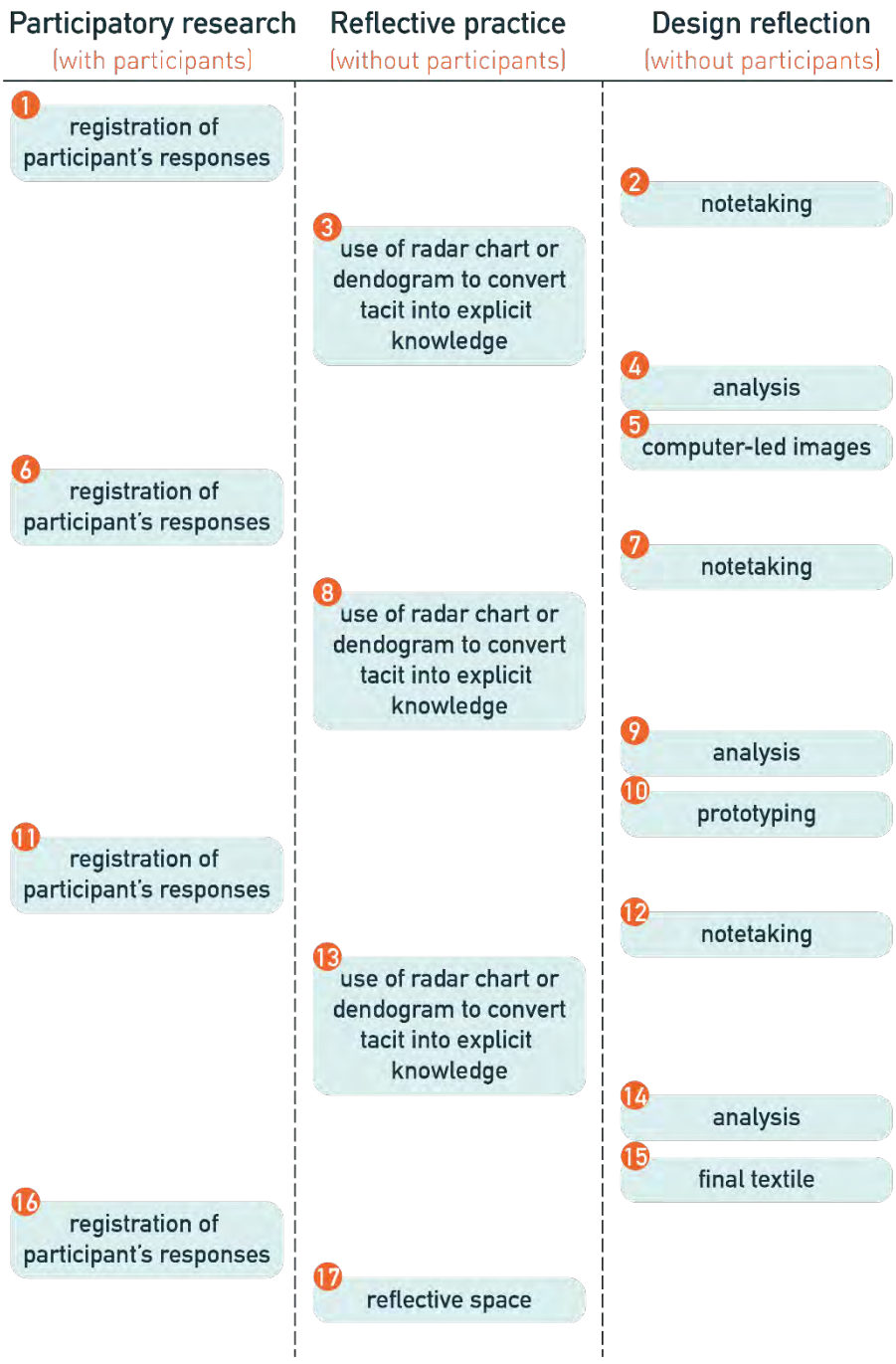


Figure 4. 1. Qualitative Multi-method triangulation within the practice investigation.

4.1.1. PARTICIPATORY PRACTICE IN THREE STAGES

The structure of the participatory practice consisted of three main stages. Figure 4.2 shows the three stages, their internal structures, and their topic of evaluation. The participants were individually involved in each stage by analysing either textile samples, computer-based interfaces or co-designed textiles using the RGT or online video-call interview as a method of evaluation.

- The RGT topic of stage one was *how sensory perception of woven textiles can elicit Emotional Experience.* The structure of this stage consisted of three RGT interviews, with each one having a different sensory mode of evaluation.
- Stage two addressed *embedding Emotional Experience during computer-led co-design experience* based on the participants' interaction with four computer-based interfaces. In order to analyse the computer-based interfaces, this stage consisted of one RGT interview.
- Finally, the structure of stage three consisted of two interviews to analyse the *computer-led co-design experience process and outcome*. The first interview analysed four co-designed textile samples made for the participants based on the two previous stages and analysing data gathered through the RGT. The second interview focused on the evaluation of a final co-designed textile, however, due to COVID-19 this interview was modified from being in-person and approached instead using an in-depth online video call interview.

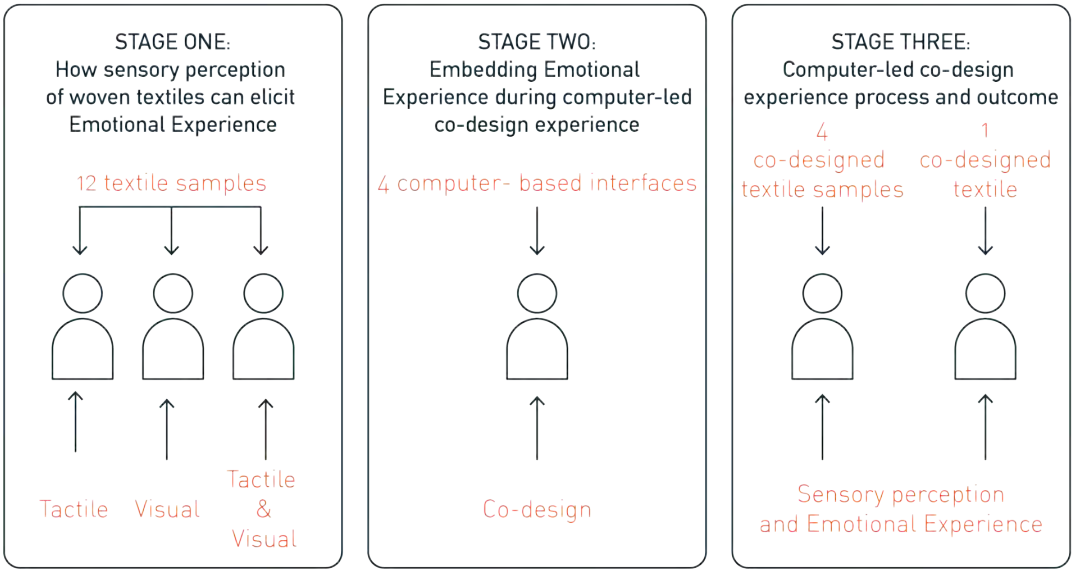


Figure 4. 2. The three stages of the practice investigation.

4.2. PRACTICE OVERVIEW

This section breaks down the three stages of the practice alongside their elements of analysis: 12 woven textile samples, four computer-based interfaces, four co-designed woven textile samples and a final co-designed woven textile per participant.

4.2.1. STAGE ONE: HOW SENSORY PERCEPTION OF WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

The topic of the first stage, which consisted of three RGT interviews, was *How sensory perception of woven textile samples can elicit Emotional Experience.* Sensory perception

refers here to the holistic process of interaction with materials, that means not only to the sensory properties of materials but also to an individual's feelings beyond the sensory domain, including emotional and semantic domains (Karana et al., 2014). Participants were asked to evaluate 12 woven textile samples using touch and vision.

While visual perception of materials includes colour of the surface and patterns, the tactile impression included the object's weight, warmth, elasticity and softness (Karana et al., 2014; Overliet et al., 2016). During Schifferstein & Cleiren's (2005) and Whiteker's et al. (2008) studies looking at similarities and differences between the roles of various senses in modulating multisensory product experience, they point out that vision and touch are equally successful in providing information about the object.

In multisensory perception, the order of stimulus influences the final perception of the product. Vision is often the first sense used to perceive certain object properties, and the information received from other senses tends to satisfy the expectancies generated on the basis of the visual properties (Karana et al., 2014). For parity with previous research (Schifferstein & Cleiren, 2005; Overliet et al., 2016), the first exploration mode used in this research for evaluating the woven textile samples was tactile unimodal analysis, second was visual unimodal analysis and third was tactile-visual bimodal analysis. In the tactile unimodal analysis, the participants could only touch but not look at the textile samples. During the visual unimodal analysis, participants were not allowed to touch the textile samples. Finally, in the tactile-visual bimodal analysis, participants used both senses together to analyse the textile samples.

4.2.1.1 TEXTILE SAMPLES

The weaving practice provides a myriad of possibilities in loom preparation and fibre selection that could mislead the purpose of this research practice. To avoid any issue and to set up boundaries for the research, this investigation looked at Overliet's et al. (2016) work, where it is posited that natural materials are often preferred over artificial ones, this applies to food, landscape or medicine. People often believe that natural products are healthier, environmentally friendlier, and more appealing to the senses. Textiles that look and feel natural, and are also comfortable to touch bring positive experiences to their users (Overliet et al., 2016).

Perceiving something to be natural is likely to be determined by inputs from sensory perceptions that may complement aspects of material properties. Some characteristics of *naturalness* that can be perceived through tactile sense are the thermal properties or the softness of the material, while colour is perceived through visual sense. In this case, the representation of these attributes most likely arises from the integration of input from different senses. Natural materials are perceived as having a positive impact, it is for this reason that this research only evaluated and analysed woven textile samples made with natural fibres.

Even though the research reduced the fibre options to solely natural fibres, the myriad of fibres under this category still gave a wide selection for sampling. It is for this reason that a small selection of fibres were selected: wool, silk, cotton and linen (Appendix C). The practice used three different types of wool: merino wool, alpaca wool and angora wool.

As the research's objectives did not attempt to analyse the colour factor of the textile samples, all the yarns were undyed, ranging from white to ecru (Figure 4.3.). The participants were informed that colour was not a factor being analyse during the research.

Figure 4. 3. Textile fibres used in this research.

Weave structures were another design consideration in this research, which aimed to present a range of textured and flat weave structures. Textured weave structures are those where through the pattern the weft and warp ends are easily distinguished by touch and sight, while flat weave structures refer to those where weft and warp ends cannot be differentiated. Like yarns, there are a myriad of weave structures. In order to reduce the number being analysed, the research used the most common weave structures such as plain or twill. A weave structure can present different patterns if the draft is designed to be pointed or straight. In

this research, there were four weave structures designed using a pointed draft – plain, twill, herringbone and sateen – and four weave structures designed using straight draft – half basket, twill, herringbone and diamond – (Figure 4.4).

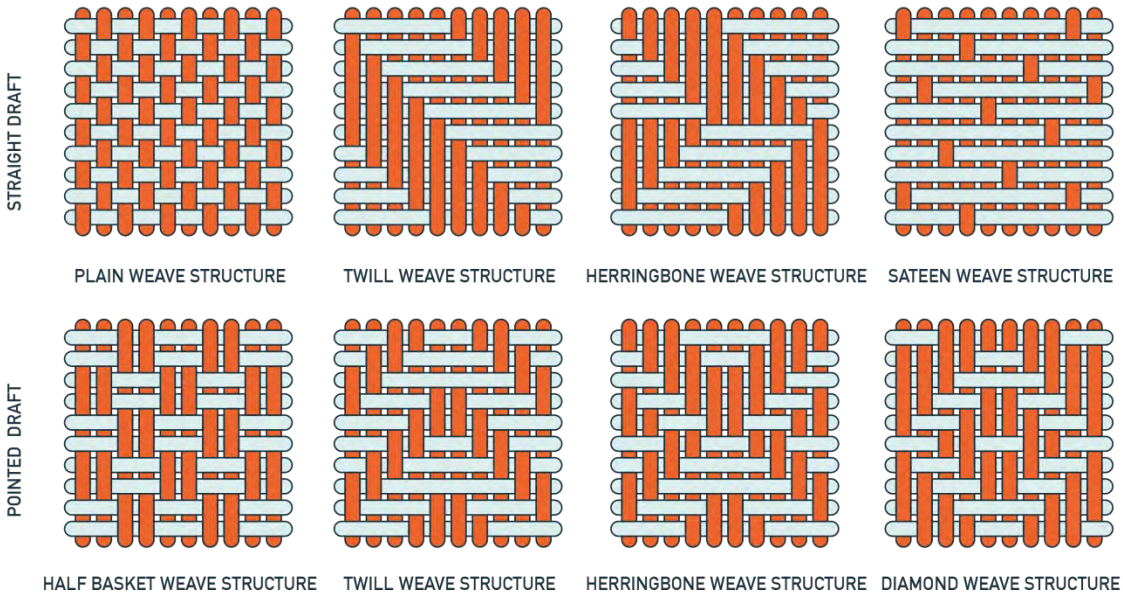


Figure 4. 4. Weave structures used in this research.

The combination of yarns and weave structures provided a total of 48 possibilities of textile samples. These were woven using a 16-shaft dobby loom due to the dobby loom providing a faster process and fitting the technical requirements for the textile samples; presenting them in 15 x 15cm, as shown in Figure 4.5.

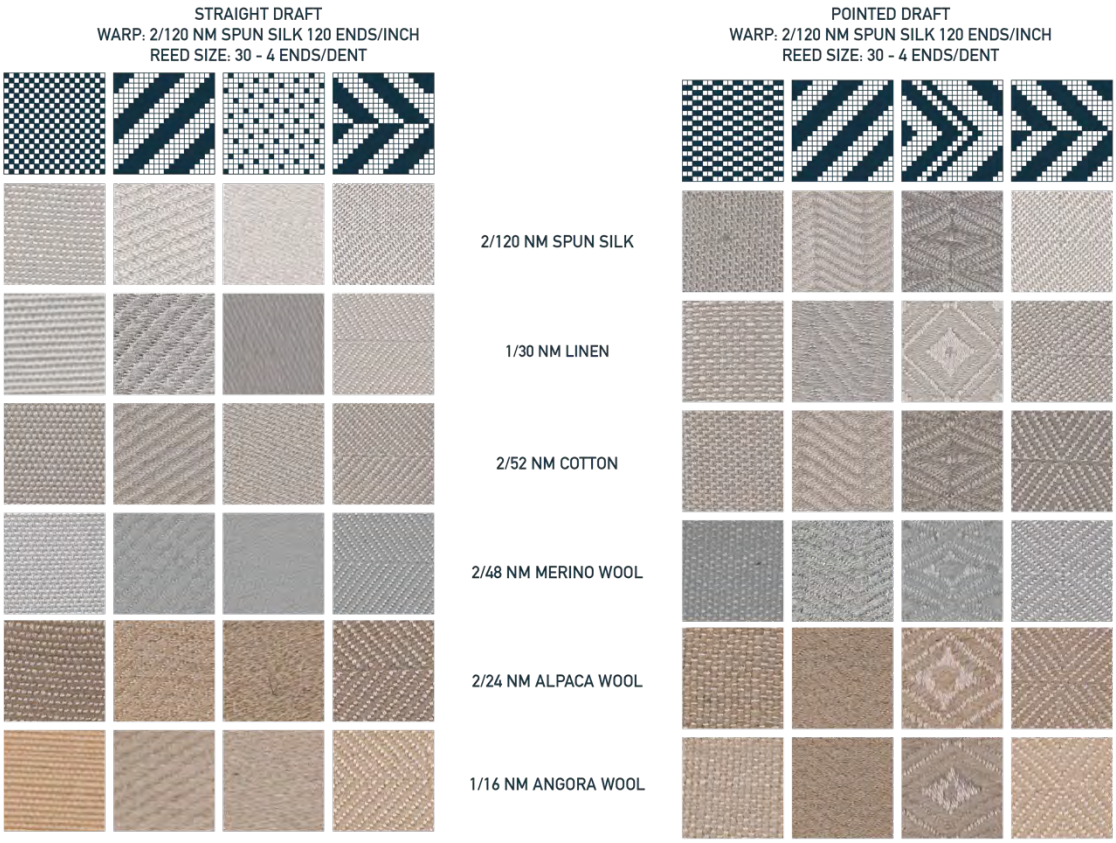


Figure 4. 5. 48 textile samples as a result of yarns and weave structures combinations.

4.2.1.1.1 RADAR CHART FROM 48 TO 12 TEXTILE SAMPLES

Based on the volunteers' feedback during the first pilot study the number of textile samples was reduced from 48 to 12. The investigation of Karana et al. (2009), *Meanings of materials through sensorial properties and manufacturing processes* was used as a guide to evaluate and reduce the samples. Karana et al. (2009) evaluate a set of sensorial properties identified as commonly used by designers in order to create certain meanings through the materials used in their products. This research used the sensory properties adequate for textiles to

evaluate them. A total of eight sensory properties were evaluated: *Softness*[26], *Weight*[27], *Strength*[28], *Roughness*[29], *Temperature*[30], *Elasticity*[31], *Glossless*[32] and *Fibre*[33]. A radar chart, which consisted of a complex form that displayed several different qualitative axes in a circular chart, presented the eight sensory properties of each textile sample in eight axes (Figure 4.6).

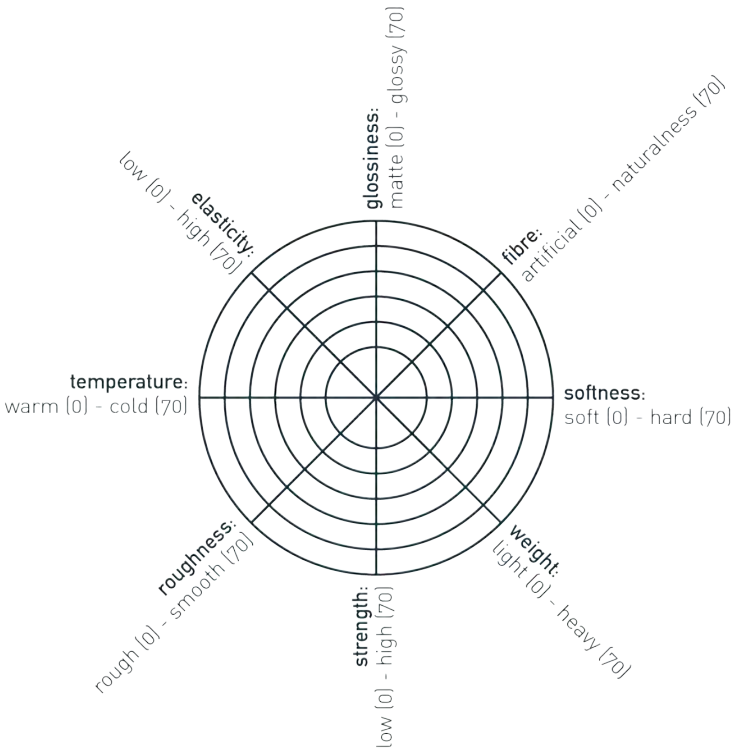
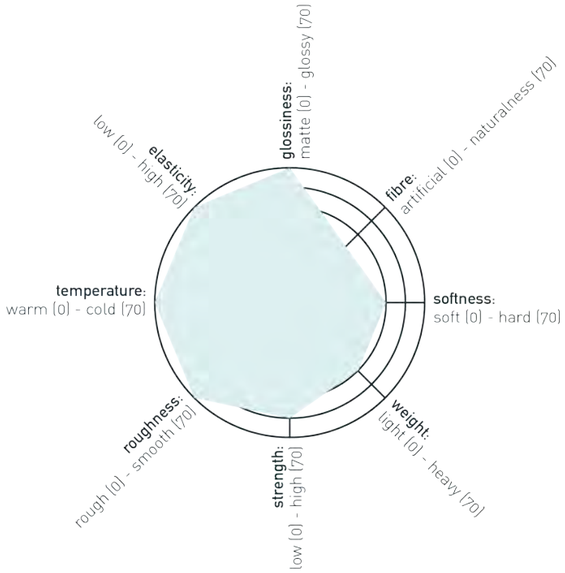


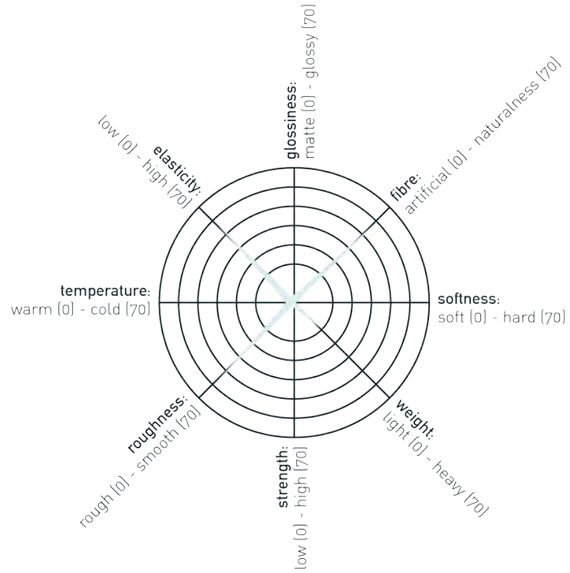
Figure 4. 6. Radar chart to analyse the sensory properties of textiles based on Karan et al.'s (2009) research.

[26] It belongs to tactual sense and distinguishes between soft and hard (Karana et al., 2009).
[27] It belongs to tactual sense and distinguishes between light and heavy (Karana et al., 2009).
[28] It belongs to tactual sense and distinguishes between low and high (Karana et al., 2009).
[29] It belongs to tactual sense and distinguishes between rough and smooth (Karana et al., 2009).
[30] It belongs to tactual sense and distinguishes between warm and cold (Karana et al., 2009).
[31] It belongs to tactual sense and distinguishes between low and high (Karana et al., 2009).
[32] It belongs to tactual visual and distinguishes between glossy and matte (Karana et al., 2009).
[33] It belongs to both senses and distinguishes between naturalness and artificial fibre (Overvliet et al., 2016).

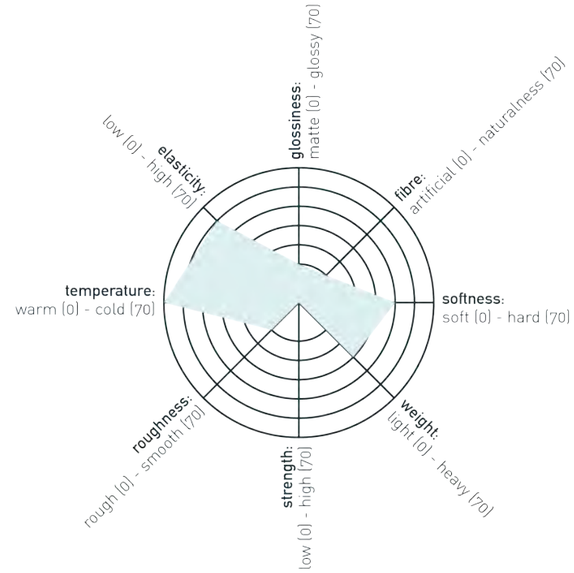
The aim of the radar chart was to analyse and visually represent the different sensory properties of the 48 textile samples in order to reduce them to 12. Appendix C provides the full analysis of the 48 textile samples conducted by myself. The research recognised the subjectivity of the analysis as well as the used of tacit knowledge during the evaluation. Once all 48 textile samples were analysed, I selected the 12 textile samples (Figures 4.7 and 4.8) that presented the greatest contrast between them in order to contain a wide variety of sensory properties.



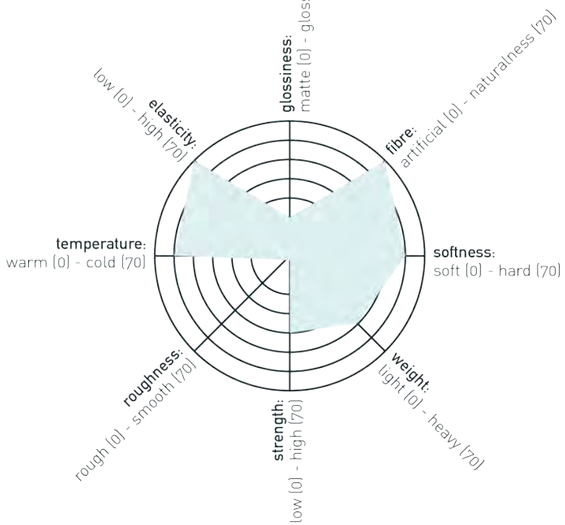
textile sample 01
| **warp:** double 2/120s nm spun silk | **weft:** double 2/120s nm spun silk
| **structure:** sateen | **draft:** double straight |



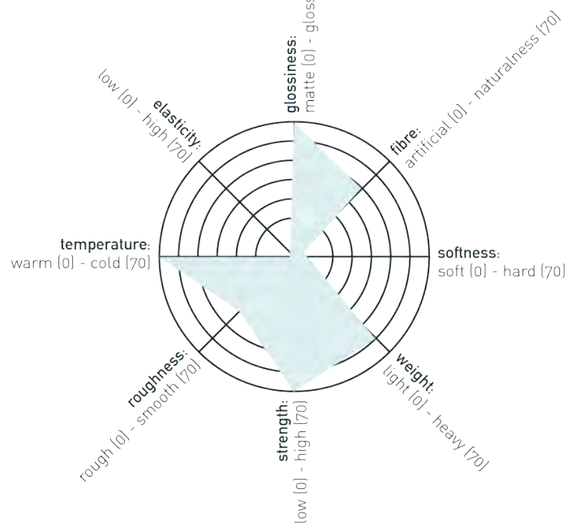
textile sample 02
| **warp:** double 2/120s nm spun silk | **weft:** 1/40s sks 100% angora
| **structure:** twill | **draft:** double straight |



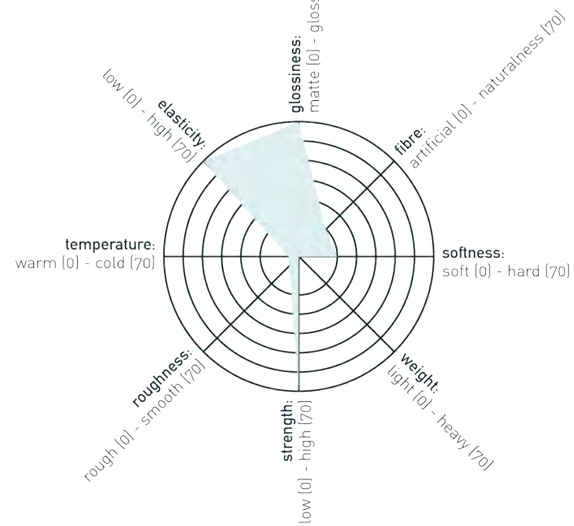
textile sample 03
| **warp:** double 2/120s nm spun silk | **weft:** 2/48s merino wool
| **structure:** twill | **draft:** double straight |



textile sample 04
| **warp:** double 2/120s nm spun silk | **weft:** 2/40 alpaca
| **structure:** diamond | **draft:** double pointed |

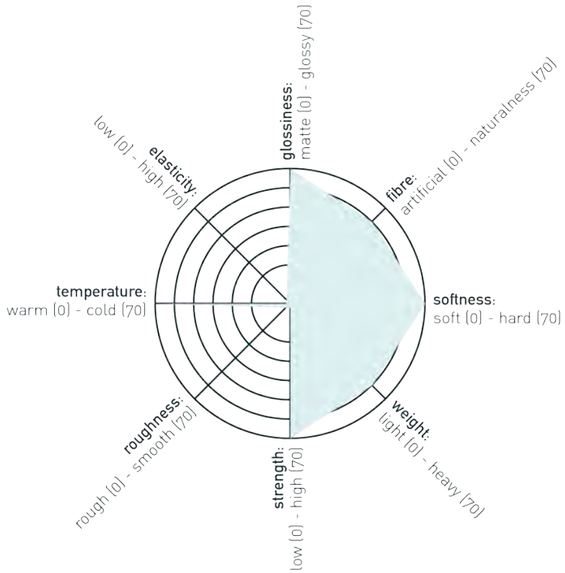


textile sample 05
| **warp:** double 2/120s nm spun silk | **weft:** double 1/24s 100% linen
| **structure:** half basket | **draft:** double pointed |



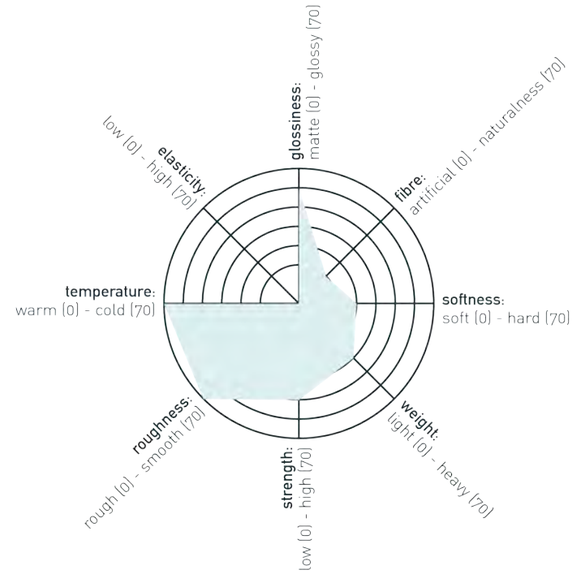
textile sample 06
| **warp:** double 2/120s nm spun silk | **weft:** double 2/120s nm spun silk
| **structure:** twill | **draft:** double pointed |

Figure 4. 7. Radar chart textile samples 1 to 6.

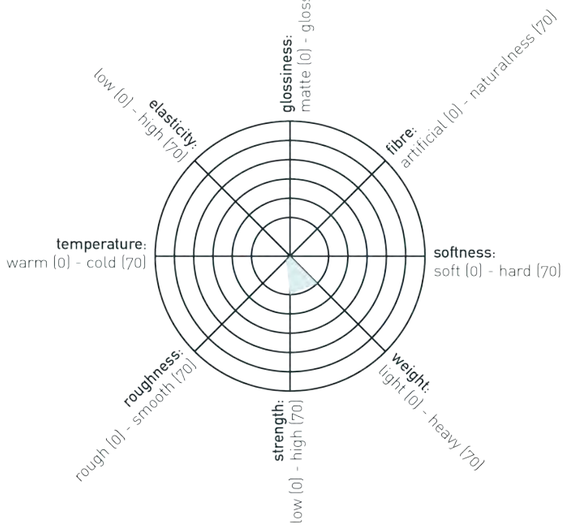


textile sample 07
| **warp:** double 2/120s nm spun silk | **weft:** double 1/24s 100% linen
| **structure:** diamond | **draft:** double pointed |

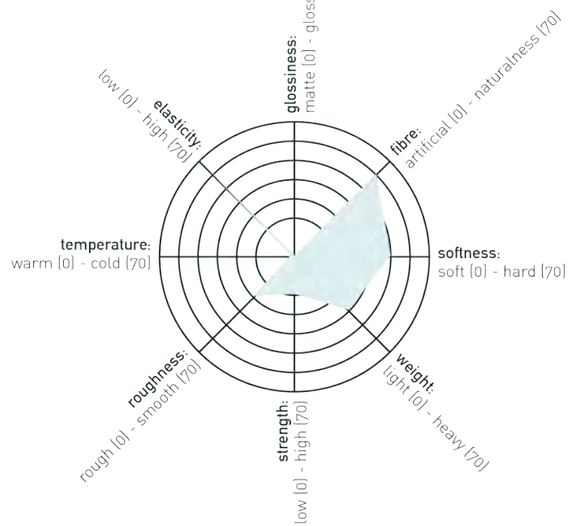
textile sample 08
| **warp:** double 2/120s nm spun silk | **weft:** 2/40 alpaca
| **structure:** half basket | **draft:** double pointed |



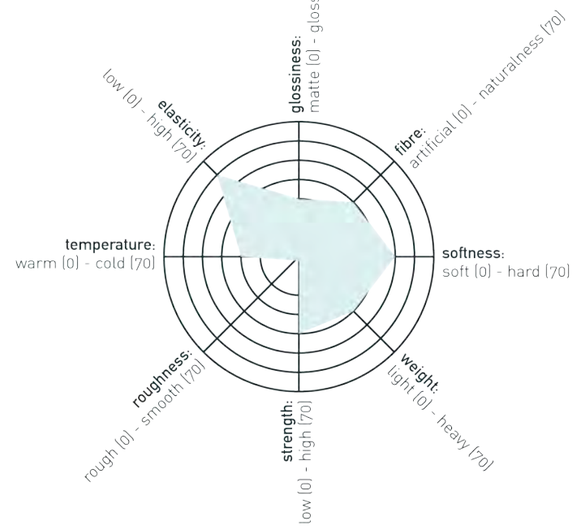
textile sample 09
| **warp:** double 2/120s nm spun silk | **weft:** 2/60s nm mercerised cotton
| **structure:** herringbone | **draft:** double pointed |



textile sample 10
| **warp:** double 2/120s nm spun silk | **weft:** 1/40 sks 100% angora
| **structure:** twill | **draft:** double pointed |



textile sample 11
| **warp:** double 2/120s nm spun silk | **weft:** 2/48s merino wool
| **structure:** sateen | **draft:** double straight |



textile sample 12
| **warp:** double 2/120s nm spun silk | **weft:** 2/48s merino wool
| **structure:** diamond | **draft:** double pointed |

Figure 4. 8. Radar chart from textile samples 7 to 12.

4.2.1.2. CONDUCTING THE REPERTORY GRID TECHNIQUE INTERVIEWS

The eight participants attended three one-to-one RGT interviews for this stage. 12 woven textile samples (Figure 4.9) were used as stimuli. The three RGT interviews presented the textile samples based on the same order used in the second pilot study. The order was as follows:

Figure 4. 9. 12 textile samples.

1. Silk yarn with sateen weave structure.
2. Angora yarn with twill weave structure.
3. Merino yarn with twill weave structure.
4. Alpaca yarn with diamond weave structure.
5. Linen yarn with half basket weave structure.
6. Cotton yarn with twill weave structure.
7. Linen yarn with diamond weave structure.
8. Angora yarn with half basket weave structure.
9. Linen yarn with herringbone weave structure.
10. Angora yarn with twill weave structure.
11. Merino yarn with sateen weave structure.
12. Merino yarn with diamond weave structure.

As mentioned in section 3.2.3.1, the RGT interview consisted of two parts. During part one, the textile samples were presented on a table with a white background for neutrality while the participant was sitting in front of them. I sat next to the participant guiding them throughout the session (Figure 4.10). At the time to analyse the textile samples, they were presented in groups of three to create six RGT bi-polar constructs. The textile samples were presented in six groups following this order:

- *First group*: created first RGT bi-polar construct and consisted of textile samples 1, 2 and 3.
- *Second group*: created second RGT bi-polar construct and consisted of textile samples 4, 5 and 6.
- *Third group*: created third RGT bi-polar construct and consisted of textile samples 7, 8 and 9.

- *Fourth group*: created fourth RGT bi-polar construct and consisted of textile samples 10, 11 and 12.
- *Fifth group*: created the fifth RGT bi-polar construct and consisted of textile samples that have shown an emotional impact to the participant. Here I used my tacit knowledge to decide which textile samples to use based on the technical aspects of the textile samples as well as a reflective practice through notetaking participants' feedback during the session.
- *Sixth group*: created the sixth RGT bi-polar construct and consisted of textile samples that have shown an emotional impact on the participant. Here I used my tacit knowledge to decide which textile samples to use based on the technical aspects of the textile samples, as well as a reflective practice through notetaking participants' feedback during the session.

Part two of the RGT interview consisted of connecting each textile sample to the RGT bi-polar constructs by scale rating them separately. The participant was asked if the textile sample under analysis was similar to either the construct or the contrast of each RGT bi-polar construct. If the textile sample was perceived as being closer to the construct it was given number 1, on the contrary if it was perceived closer to the contrast then number 5. When the textile sample did not have any connection to the construct or contrast then it was rated number 3. Finally, number 2 and 4 represented being similar to the construct or contrast respectively. Each interview collected participants' RGT bi-polar constructs and scale-rating through an RGT sheet (Figure 4.11).

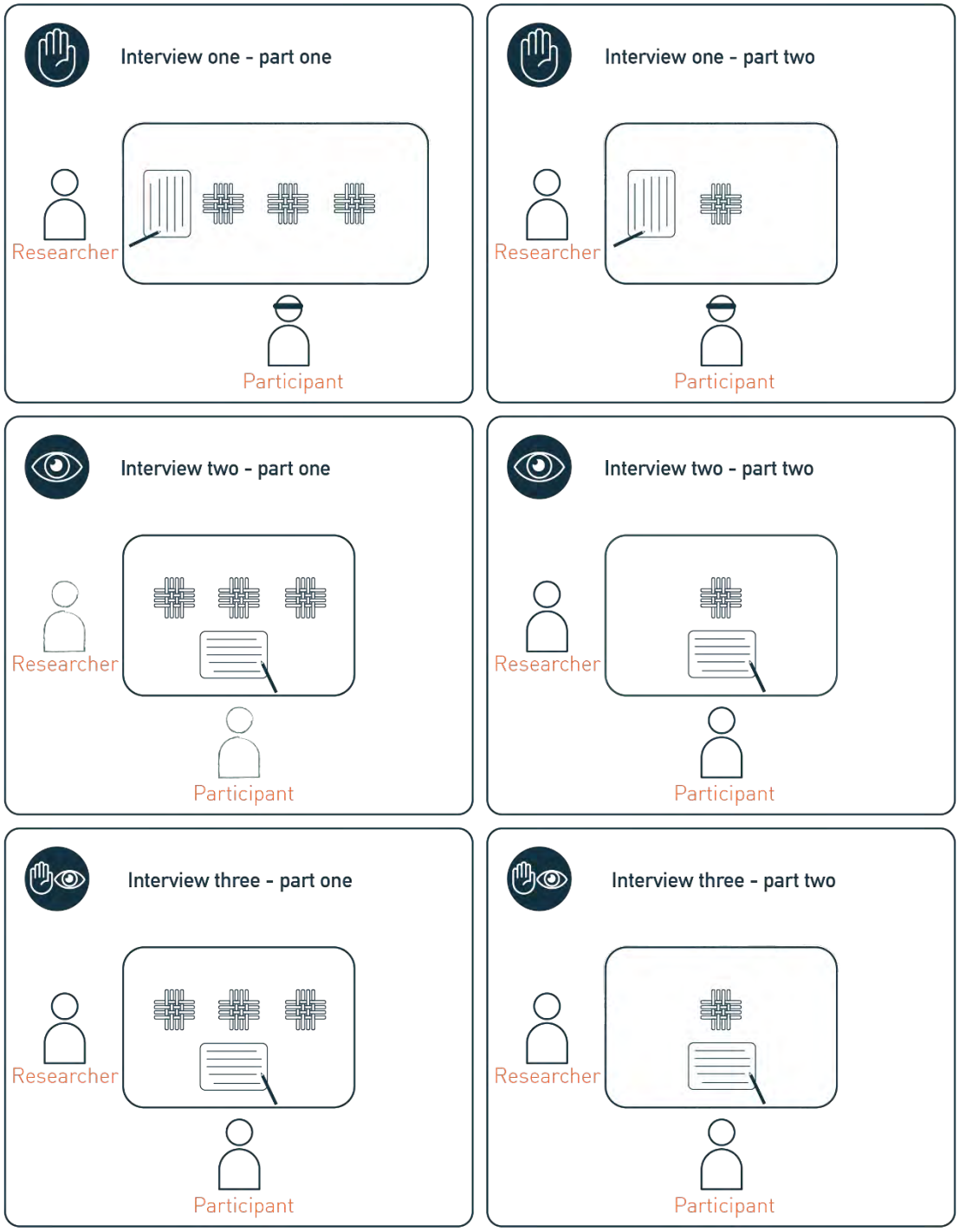


Figure 4. 10. Graphic representation of the set-up of the textile samples, participant and researcher in each session of stage one.

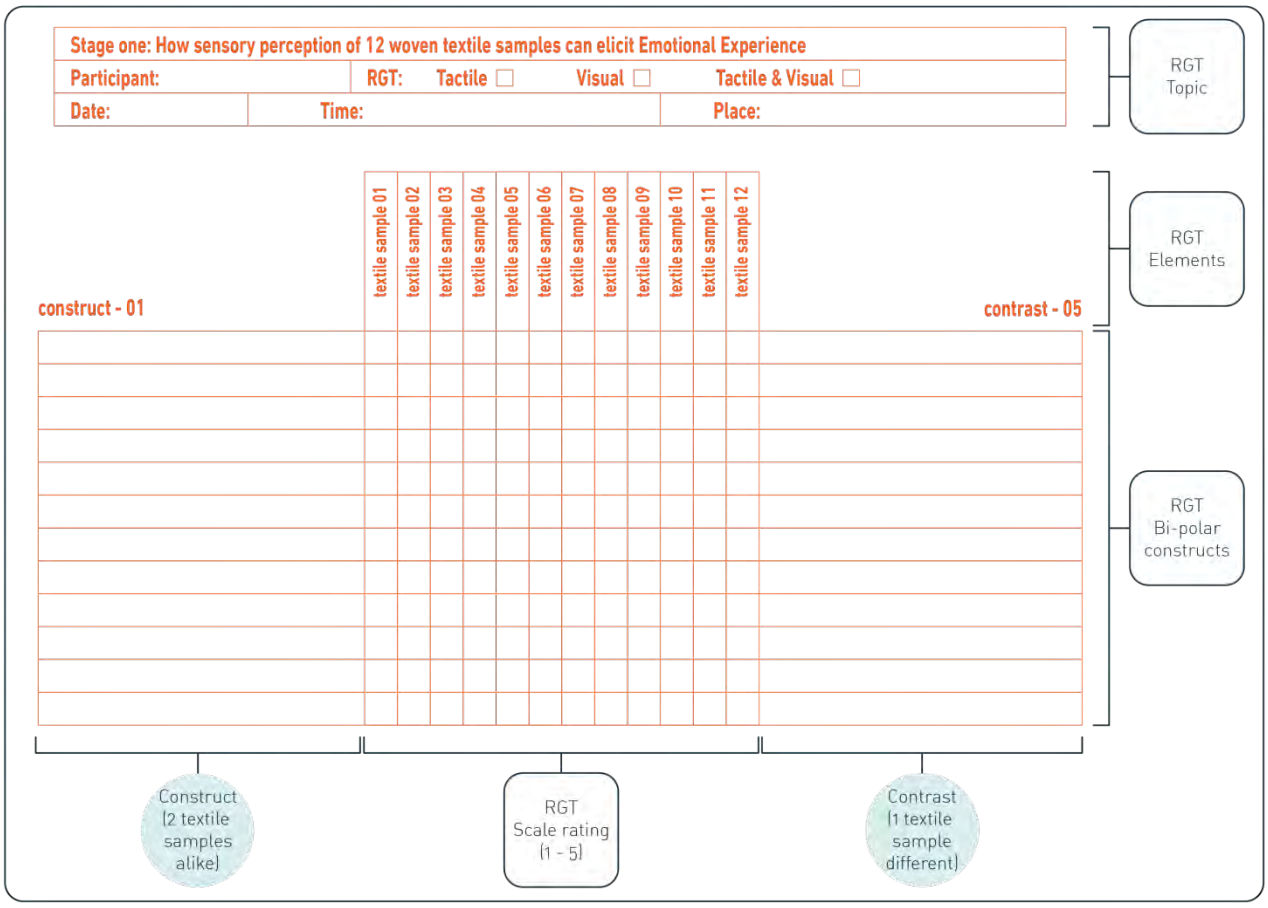


Figure 4. 11. Repertory Grid Technique interview sheet.

4.2.1.2.1. INTERVIEW ONE: TACTILE UNIMODAL ANALYSIS

While I sat next to the participant, I gave instructions to the participant and guided them through the session. Before starting the interview, the participant was given a short explanation of the session and it was reaffirmed that they could ask any questions or request a break during the session. Then I explained the basics of RGT and how to use an RGT sheet during the interview.

The participant was then informed that they would be blindfolded with a sleep mask, and that if they needed to take a break, they should announce it and I would hide the textile samples

so they would not make any visual contact with them. In addition to the use of the sleep mask, the participant was requested to use hand sanitiser to protect the textile samples from any damage.

Once the participant was ready, the RGT interview started. They were handed the first three textile samples and asked to create a RGT bi-polar construct. To do so, I asked which two of these three textile samples felt alike and which one differed based on the elicitation of Emotional Experience when touching the woven textiles. While asking the question, the participant could examine the textile samples with as much time as they needed, whilst being able to touch and move them around them with both hands (Figure 4.12). With the answers given by the participant, I wrote the RGT bi-polar constructs down and proceeded to do the same with the other textile samples. On the left side of the RGT sheet I entered the construct and on the right side of the RGT sheet the contrast of the RGT bi-polar construct. Once all the textile samples were assessed, I then selected two more sets of three textile samples to create RGT bi-polar constructs five and six.

Figure 4. 12. Participant evaluating textile samples using the tactile sense during session one of stage one.

For instance, participant C created the following RGT bi-polar construct when analysing textile samples 4, 5 and 6. They considered that the textile samples 5 and 6 felt like 'Tablecloth feel, underneath' as a construct, and textile sample 4 was the different one, creating 'I don't like it at all, it doesn't feel nice. Scarf/blanket that loses the fibres' as contrast. Once the first part of the session was done, then the participant rated the 12 textile samples using a scale-rating from 1 to 5 (section 3.2.3.1).

The average time for this session was an hour due to the lack of the participant's autonomy to write down their own RGT bi-polar constructs and scale-rating. In order to verify that the

RGT bi-polar construct reflected participant's words and scale-rating, I double checked each RGT bi-polar construct and scale-rating with the participant throughout the session.

4.2.1.2.2. INTERVIEW TWO: VISUAL UNIMODAL ANALYSIS

During the second interview participants were more familiar with the RGT method and felt more comfortable with the session. As the evaluation mode was conducted using the visual sense, the participants were not able to touch the textile samples. The samples were presented in sets of three, in the same order as the tactile sense stage, on a table with a white background.

At the start of the interview, I explained the steps of the session in order to help the participant understand what was expected from them and reassure them that questions were welcome at any point of the interview. I then proceeded to present the first group of textiles and asked them which two of the textiles looked alike and which one looked differed based on the elicitation of Emotional Experience of woven textiles. The participant could request to move the textile sample around and to be show the back of them. The participant could spend as much time as they needed to evaluate the textile samples (Figure 4.13). Once the participant had created the RGT bi-polar construct, I requested them to write down the construct on the left side of the RGT sheet and the contrast on the right side. After the participant had analysed all the textile samples and created the four RGT bi-polar constructs, I then asked the participant to create two more RGT bi-polar constructs based on the textile samples that brough a stronger elicitation of Emotional Experience.

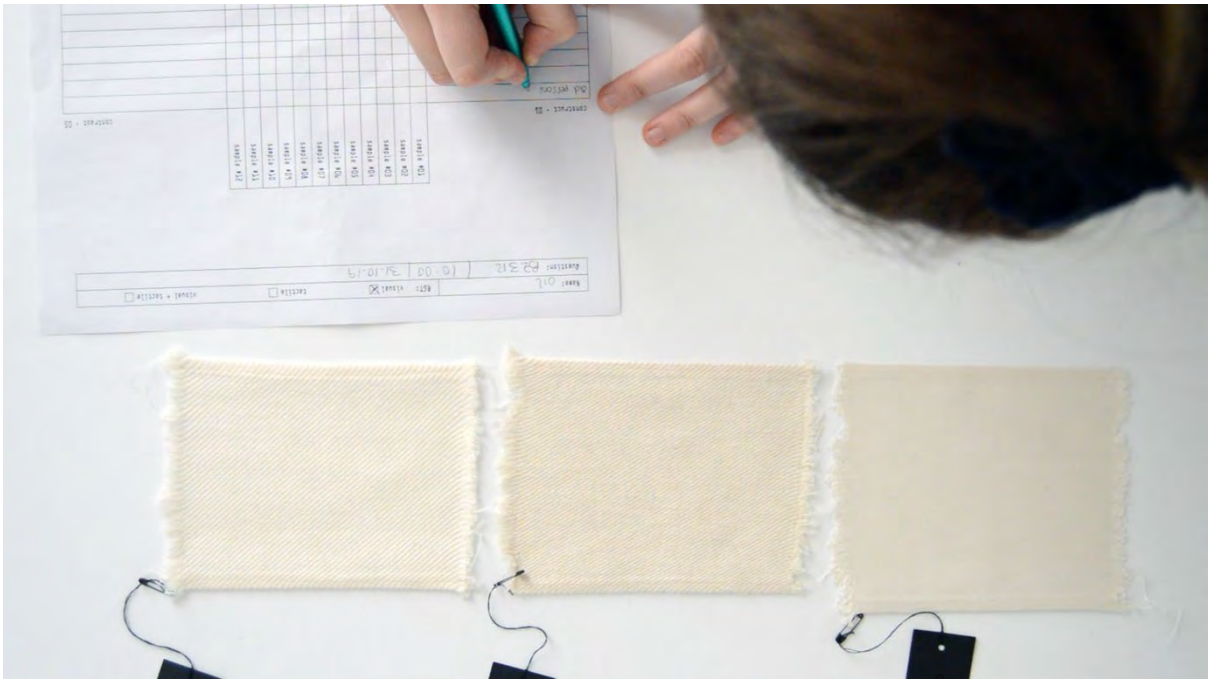


Figure 4. 13. Participant evaluating textile samples using the visual sense during session two of stage one.

Once the first part of the session was complete, the participant scale-rated the 12 textile samples based on their RGT bi-polar constructs. To create the scale-rating, the participant analysed each textile sample individually and it was presented alone. The average time for this session was 35 minutes due to the fact that the participant could write their RGT bi-polar constructs and scale-rate the textile samples without the additional task of relaying them to the designer-researcher.

4.2.1.2.3. INTERVIEW THREE: TACTILE-VISUAL BIMODAL ANALYSIS

The third interview was a combination of previous RGT interviews. The participants evaluated the textile samples through a tactile-visual bimodal analysis. At this point the participant was familiar with the method of the interview and felt confident during the session. I requested the participant to use the hand sanitiser provided to protect the textile samples before proceeding with the analysis. I then explained all steps of the session and asked them to communicate if a break was needed during the session or if they had any questions, they could let me know at any point.

The textile samples were presented in the same order as the previous interviews, in groups of three on a white background. The participant examined the textile samples using both senses, tactile and visual, without time or movement restrictions (Figure 4.14). I then asked the participant to identify why two looked and felt alike, and why one differed based on the elicitation of Emotional Experience of woven textiles. With their feedback, the participant wrote down the RGT bi-polar constructs; the construct on the left side of the RGT sheet and the contrast on the right side. The participant evaluated 12 textile samples; and then I asked them to create two more RGT bi-polar constructs based on their feedback.

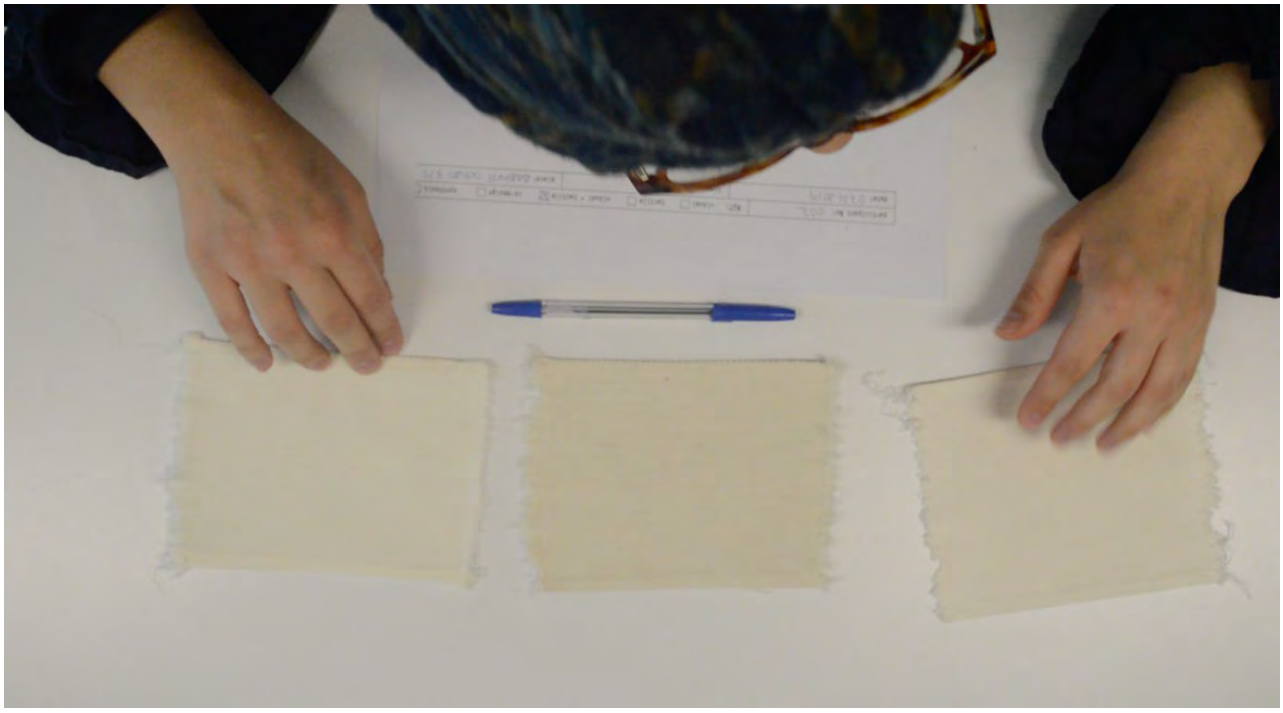


Figure 4. 14. Participant evaluating textile samples using the tactile and visual senses during session three of stage one.

After the first part of the session was complete, the participant proceeded to scale-rate each textile sample based on the RGT bi-polar constructs. To create the scale-rating, the participant analysed each textile sample alone. The average duration of the third interview was 40 minutes.

4.2.2. STAGE TWO: EMBEDDING EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

The second stage, composed of one interview, looked at *Embedding Emotional Experience during the computer-led co-design experience*. Based on co-design literature, this research defined computer-led co-design experience as the democratic collaboration and cooperation

of designer and individual in the design development process using a computer-based interface. While the designer's responsibility is to create a balance between introducing design opportunities and guaranteeing design standards, the individual agrees in collaborating within the design phase. This concept resonates with Mugge et al. (2009a), when they suggest that the designer should develop toolkits that would allow the individual to play with them, but with limitations that guarantee adequate product quality. This research presented a democratic and balanced co-design process, where I was the facilitator of the investigation and presented computer-based interfaces which the participants interacted with to design a digital Jacquard woven textile that elicited Emotional Experience.

4.2.2.1. THE DEVELOPMENT OF COMPUTER-BASED INTERFACES

The computer-based interfaces were designed as a space for co-design woven textiles using digital coding. To develop them, the computer-based interfaces reflected my previous work (Woven Memories, 2016) by incorporating text to generate an abstract pattern. The idea of encoding text into textiles aimed to bring language to the textile, and reflect the '…intimacy and complexity for thought in its association with making…' (Mitchell, 2012: 324). Both, textile and text share the same Latin etymology *texere,* meaning *to weave*. As Mitchell (2012) states, the textile becomes a kind of speaking and for language a kind of making, the encoded text is the language to create an abstract pattern, and the materiality of the textile brings the text back. Here participants were asked to write a text in each computer-based interface, which each presented a different requirement (section 4.2.2.1). Then through the use of binary code, ASCII (American Standard Code of Information Interchange) or random code, the text was

encrypted into an abstract pattern of white and black squares. When using ASCII code, the letters were translated into a grid of eight 0 and 1 following the ASCII system created in the United States in 1963 and updated in 2017. The 0 were represented by white squares and 1 by black squares. When using the random code, the letter generated a codified random grid of eight 0 and 1, and then translated them into white and black squares respectively (Figure 4.15).

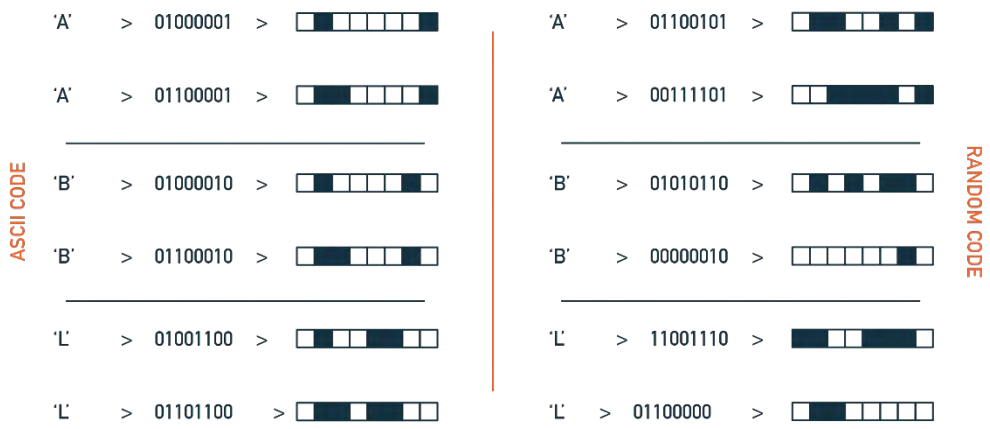


Figure 4. 15. ASCII code and random code.

The focus of the computer-based interfaces' investigation was on the co-design elements, where the user interaction was beyond the scope of this research. Shneiderman (1987) was one of the first to use the phrase *user interface*, creating the eight golden rules of interface design: Consistency[34], Enable frequent users to use shortcuts[35], Offer informative feedback[36],

[34] Standardising the way information is conveyed with familiar icons, colours, menu when designing similar situations and sequence of action (Shneiderman, 1987).
[35] Providing space for shortcuts helps the user to interact more quickly and effortlessly once they become more experienced (Shneiderman, 1987).
[36] The user should be informed with readable feedback, indicating the user where they are at during the process of interaction (Shneiderman, 1987).

Design dialogue to yield closure[37], Offer simple error handling[38] and Permit easy reversal of actions.[39] Shneiderman's (1987) work contributed to the design of the computer-based interfaces as well as the recent study of De Bellis et al.'s (2019) regarding personalising mass-customisation and cultural information processing. De Bellis et al. (2019) presents two classifications of interfaces:

- *By-attribute*: is the most predominantly used option within mass-customisation. It provides a sequential configuration process focusing on individual attributes. This process of designing by attribute mimics the production sequence of bottom-up assembly. An example of by-attribute is the Nike By You (Bowerman, 2021) interface.[40]
- *By-alternative*: selects user's preferences of product from a set of fully assembled alternatives, employing a top-down process. An example of by-alternative is Apple[41], providing a fully assembled laptop with the opportunity to make changes.

As the design of the woven textile was built on a text, the conception of the computer-based interfaces was based on by-attribute. De Bellis et al. (2019) distinguishes two engagements of by-attribute interface, analytic and holistic engagements. *Analytic by-attribute* interface focuses on salient information, 'without weighing contextual or peripheral information as heavily' (De Bellis et al., 2019: 1051), the information is processed analytically possessing

[37] Being affirmative once the action has finished or new actions are requested (Shneiderman, 1987).
[38] Provide intuitive step-by-step instructions to solve the problem (Shneiderman, 1987).
[39] Provide an obvious way to reverse the action.
[40] https://www.nike.com/gb/u/custom-nike-metcon-6-by-you-10000910/3310631611#Builder [Accessed on 5th July 2021]
[41] https://www.apple.com/shop/buy-mac/macbook-pro/16-inch-space-gray-2.6ghz-6-core-processor-512gb# [Accessed on 5th July 2021]

unique and independent attributes. For instance, WOVNS (D. Molnar & C. Molnar, 2018) interface[42] is a clear example of analytic interface, where the interface presents a step-by-step process. *Holistic by-attribute* interface considers '…all the attributes in the interface to be equally important and inherently connected…' (De Bellis et al., 2019: 1051), therefore they are presented together instead of separately. An example is Unmade (Hal Watt et al., 2014) interface[43], where all the attributes are presented together. During the design phase of the computer-based interfaces the analytic and holistic by-attributes were considered, creating two interfaces with analytic engagement and two interfaces with holistic engagement.

To provide co-design attributes for the designing of the computer-based interfaces, the research focused on the elements of process and product presented by Thallmaier (2015):

Product:

- *Preference Fit*: presented the characteristics of the co-designed textile to elicit Emotional Experience to the individual. The computer-based interfaces provided different attributes to accommodate participants' preferences based on sensory perception.
- *Uniqueness*: created unique textiles through the variety of options to personalise them. The computer-based interfaces were designed to bring opportunities at the time of selecting the text, yarns, weave structures and pattern size. By personalising the textile with individual's preferences, the individual could emotionally connect

[42] https://www.wovns.com/newdesign?o=non-repeating [Accessed on 5th July 2021]
[43] https://www.unmade.com/ [Accessed on 28th September 2018]

more with the final outcome with the consequence that the textile can elicit Emotional Experience.

- *Self-expression*: provided the right attributes for participants to reflect their personality through the textile and therefore influence the future elicitation of Emotional Experience. Although not the same as uniqueness, the achievement of self-expression was also based on attributes that bring opportunities for participants to represent and see themselves.
- *Uncertainty*: referred to participants not receiving the final co-designed textile instantly which could cause doubt. To reduce uncertainty the computer-based interfaces presented digital visualisation of the textile's design; however, the digital visualisation could not provide a tangible representation of the final product itself. To compensate for this, a tangible textile guide (Figure 4.16). was present during the co-design process, where participant could use vision and touch to evaluate their options.

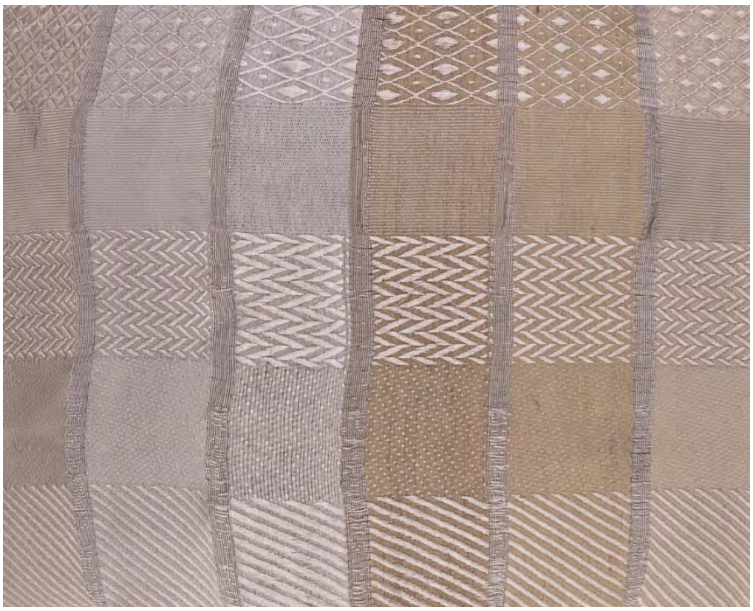


Figure 4. 16. Textile guide to complement the computer-based interfaces.

Process:

- *Enjoyment, Fun & Hedonism*: interacted with the computer-based interfaces and engaged in the co-design process, so that individuals could enjoy the process which could then be reflected in the outcome.
- *Creative Achievement*: created a woven textile sample through the different options, which provided an autonomy during the interaction with the interface that could lead to a creative achievement.
- *Pride of Authorship*: created a feeling of being the original designer, or co-designer, of the final woven textile. The participants needed to achieve a sense of autonomy and decision making during the interaction with the computer-based interfaces.
- *Level of* Confusion: the possibilities of the computer-based interfaces used at each stage of the process could cause a level of confusion for the participants due to the number of attributes, navigation or the digital visualisation.
- *Cognitive Effort*: invited individuals to make decisions on selecting a text, yarns and weave structures, which could promote a positive cognitive effort.

After the conceptualisation of the attributes, the layout and structure of the computer-based interfaces were founded on Unmade (Hal Watt et al., 2014), Abstract_ (Eriksen, 2016), Woven Memories (Nadal, 2016) and WOVNS (D. Molnar & C. Molnar, 2018), interfaces. The four interfaces had a live visualisation section of the final product, and personalisation section to select technical aspects of the textile such as colour, size and repetition of the pattern. While WOVNS and Abstract_ presented an analytic by-attribute interface, Unmade and Woven Memories used a holistic by-attribute interface. Based on their interfaces and with the

collaboration of a computer engineer to develop the computer-based interfaces, initial prototypes of the computer-based interfaces were made and analysed with the volunteers of my second pilot study (Appendix B). After the first test with volunteers and through a period of reflection, the computer-based interfaces were modified to achieve the aim and objectives of the research.

Figure 4.17 presents the attributes of each computer-based interface based on volunteers' feedback during the second pilot study, the work from Shneiderman (1987), De Bellis et al. (2019), Thallmaier (2015) as well as elements of in-store co-design (Herd, 2012) and web-based co-design (Herd, 2012; Friedrich, 2013). Although all computer-based interfaces presented attributes to evaluate the same characteristics, each one was unique and different from the others.

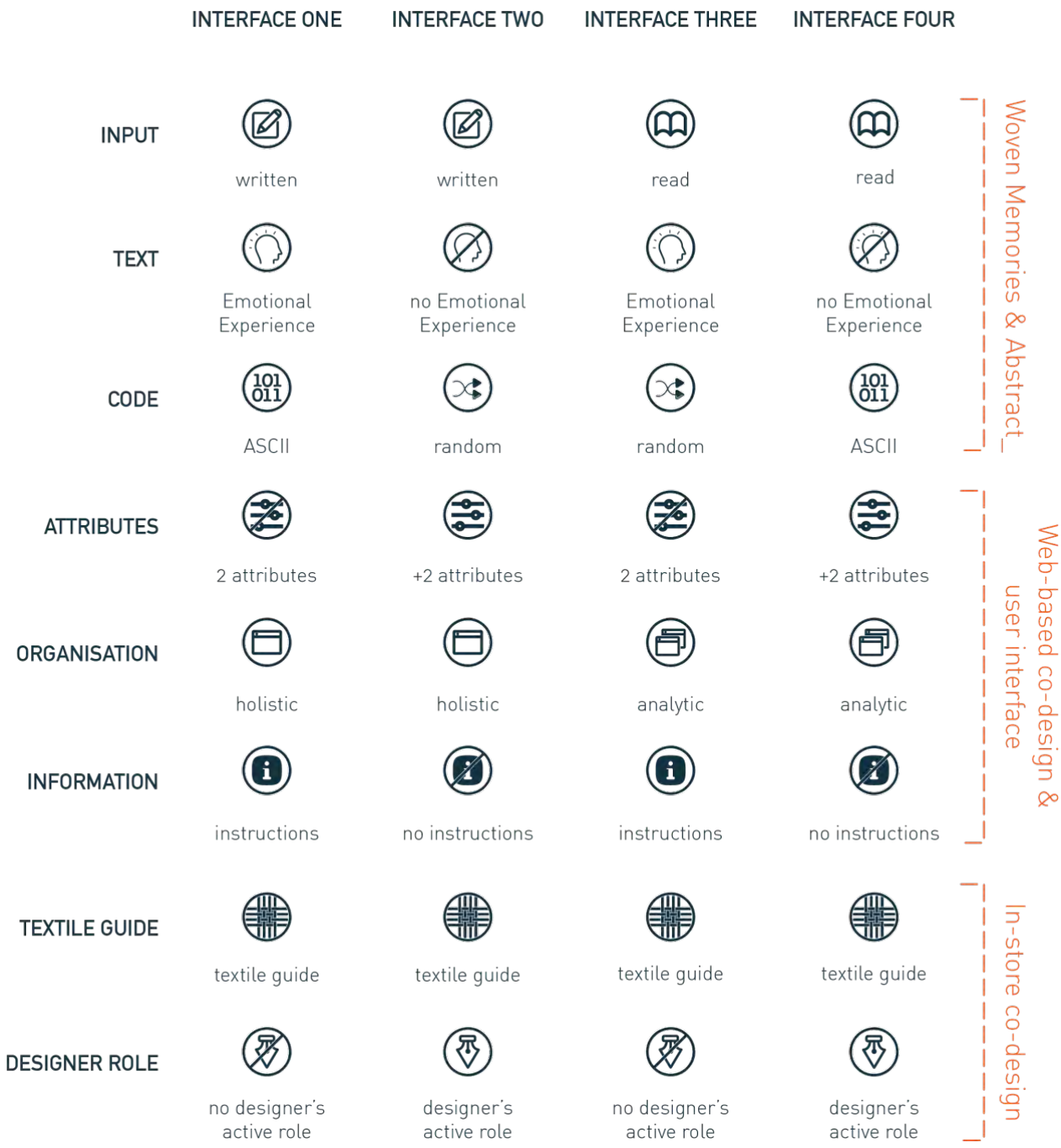


Figure 4. 17. Computer-based interfaces' attributes.

4.2.2.1.1. COMPUTER-BASED INTERFACE ONE

The attributes of computer-based interface one were (Figure 4.18):

- The participant was invited to bring a text that they wrote and had an emotional connection to. They could bring any kind of text such as a poem, message, or assignment.
- Each element of the computer-based interface had a help guide to explain its functions. Once the participant was familiar with the interface, they introduced the text into the interface and a pattern was created using ASCII code.
- The computer-based interface was based on holistic by-attribute approach, and only presented two yarn and weave structure options.
- The computer-based interface was complemented with a textile guide for participants to use their sensory perception.

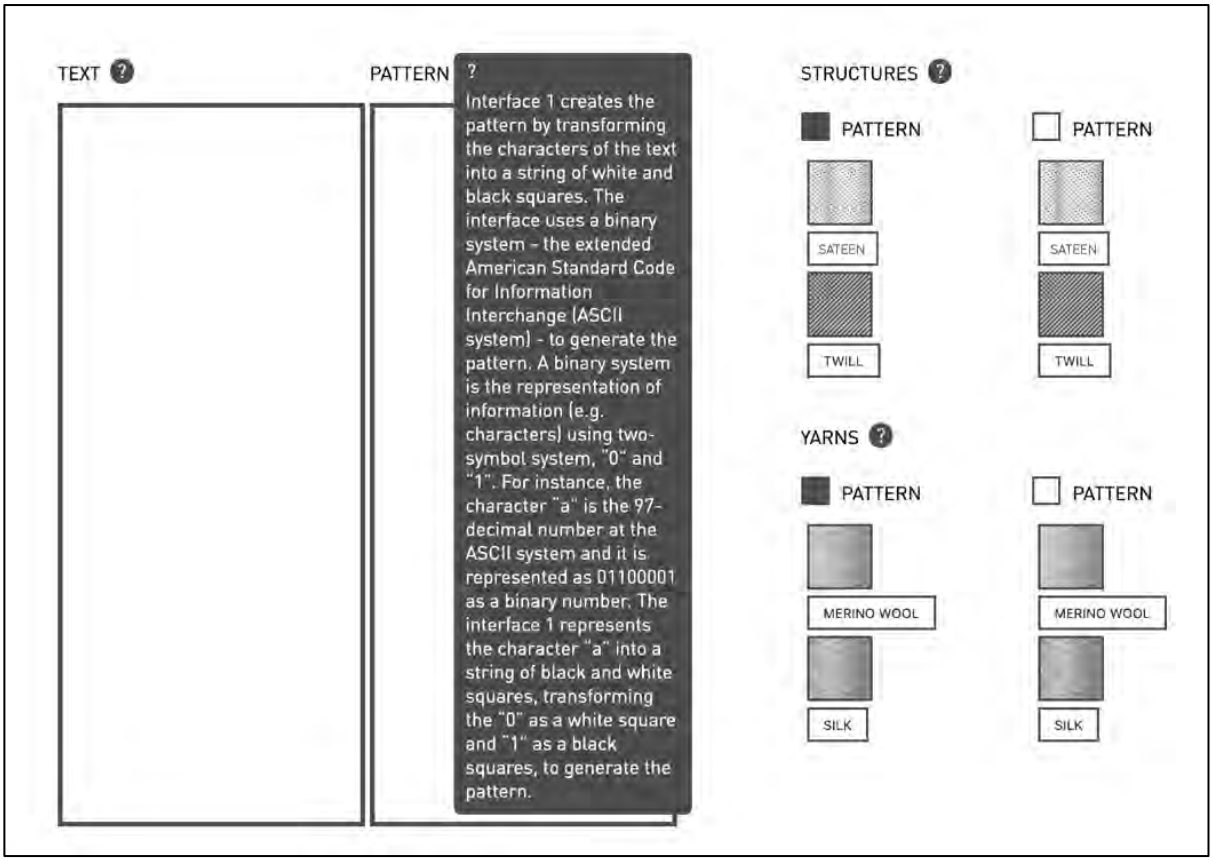


Figure 4. 18. Computer-based interface one.

4.2.2.1.2. COMPUTER-BASED INTERFACE TWO

The attributes of computer-based interface two were the following (Figure 4.19):

- The participant was invited to bring a text that they wrote and did not have an emotional connection to. The participant could bring any kind of text such as poem, message, or assignment.
- The computer-based interface did not provide any help guide, however I had an active role as a designer to assist them during the creation of the textile design. Once the participant was familiar with the interface, then they introduced their text into the

interface and using random code a pattern was created. They could change the pattern as many times as needed until they felt satisfied with the pattern.

- The computer-based interface presented different yarn, weave structure and size of the pattern options, which were presented as holistic by-attribute approach.
- The computer-based interface was complemented with a textile guide for participants to use their sensory perception.

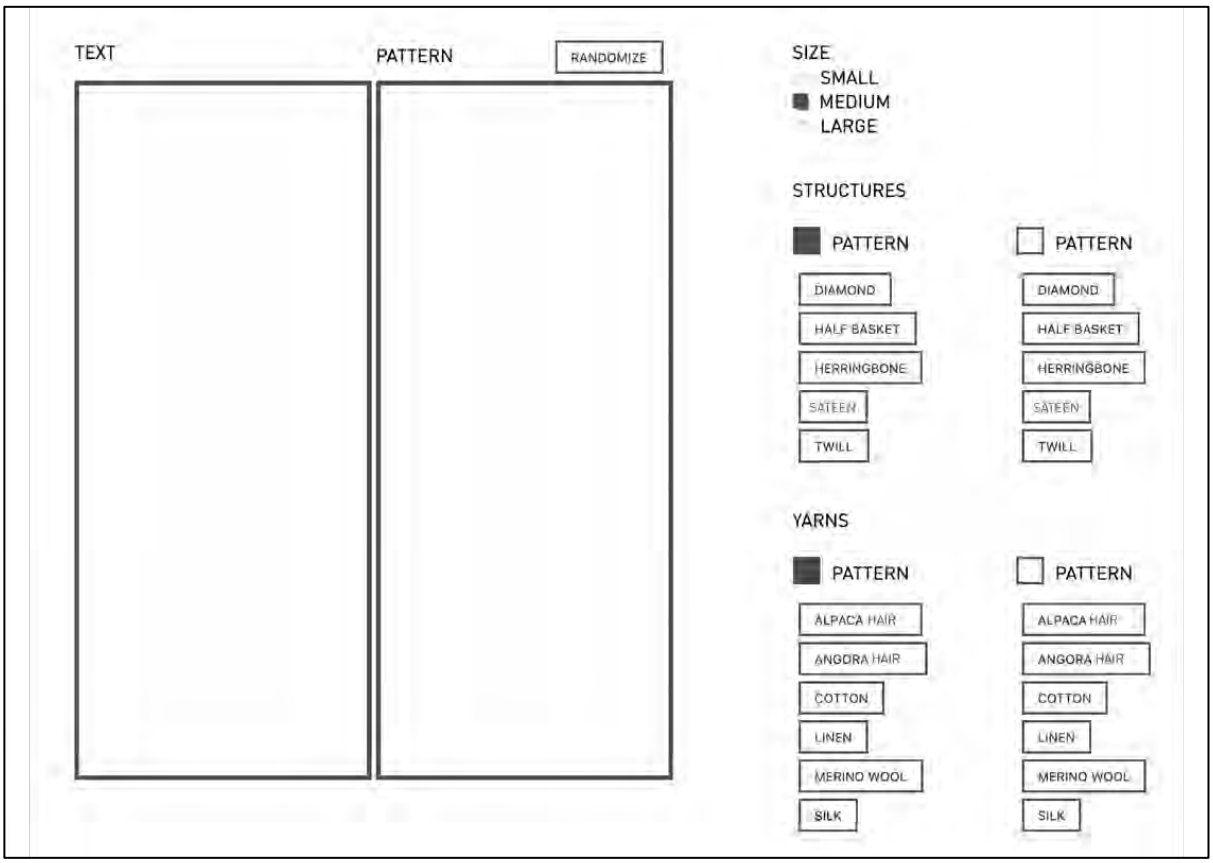


Figure 4. 19. Computer-based interface two.

4.2.2.1.3. COMPUTER-BASED INTERFACE THREE

The elements of computer-based interface three were the following (Figure 4.20):

- The participant was invited to bring a text that they read and had an emotional connection to. The participant could bring any kind of text such as a poem, message, or assignment.
- Each element of the computer-based interface had a help guide to explain its functions. Once the participant was familiar with the interface, they then introduced the text into the interface and using random code a pattern was created. They could change the pattern as many times as needed until they felt satisfied with the pattern.
- The computer-based interface only presented two yarn and weave structure options, which were presented in analytic by-attribute approach.
- A textile guide was presented in order to help participants make decisions about the yarns and weave structures.

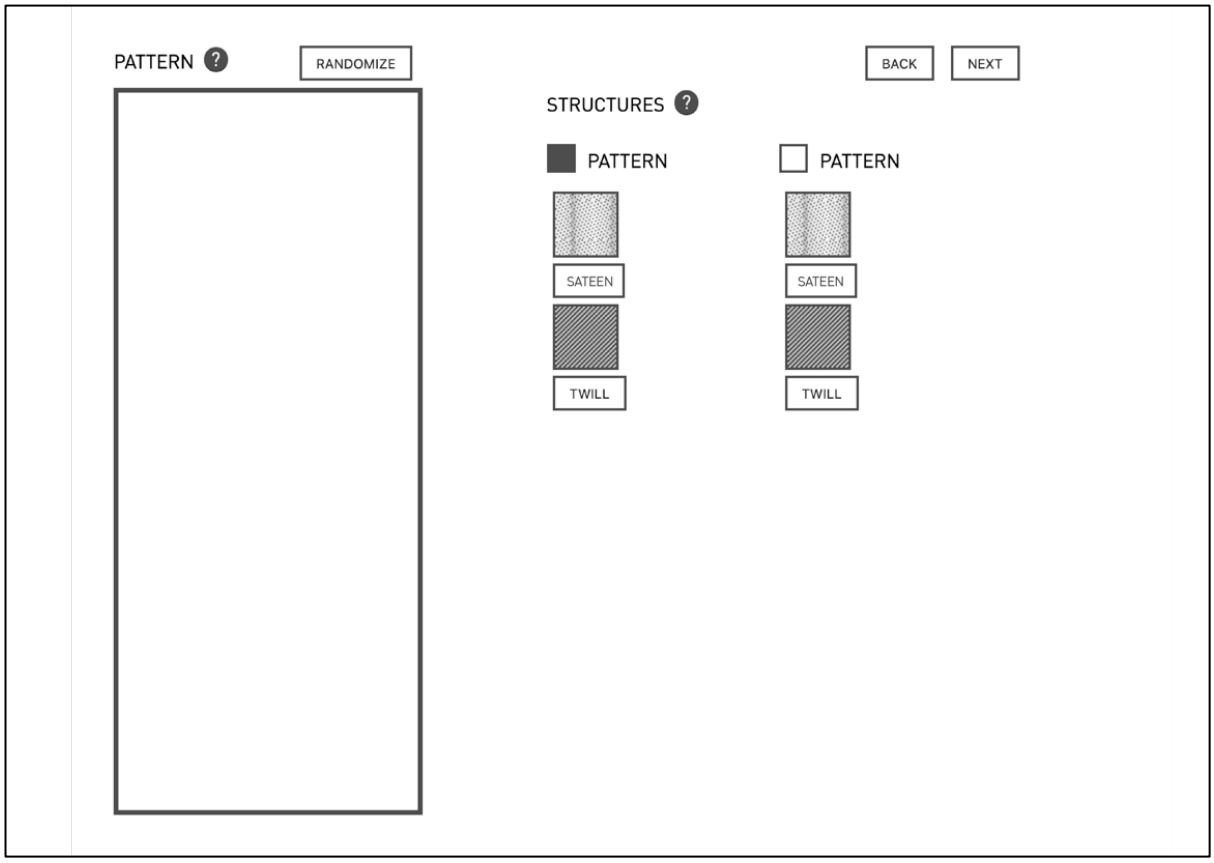


Figure 4. 20. Computer-based interface three – second page.

4.2.2.1.4. COMPUTER-BASED INTERFACE FOUR

The elements of computer-based interface four were the following (Figure 4.21):

- The participant was invited to bring a text that they read and did not have an emotional connection to. The participant could bring any kind of text such as a poem, message, or assignment.
- The computer-based interface did not provide any help guide, however I had an active role as designer to assist the participant. Once the participant was familiar with the

interface, they introduced the text into the interface and using ASCII code a pattern was created.

- This computer-based interface presented different yarn, weave structure and size of the pattern options, which were presented using analytic by-attribute approach.
- A textile guide was presented in order to help participants to make decisions about the yarns and weave structures.

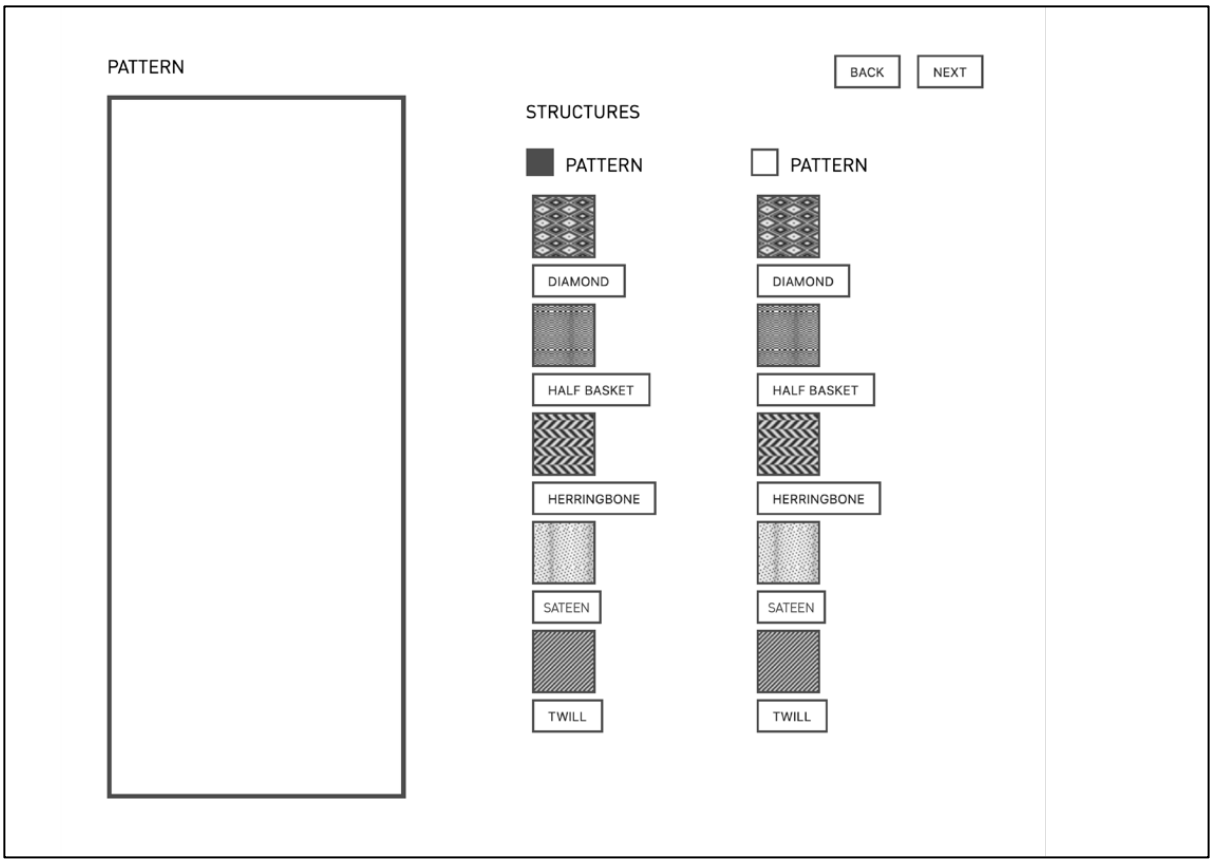
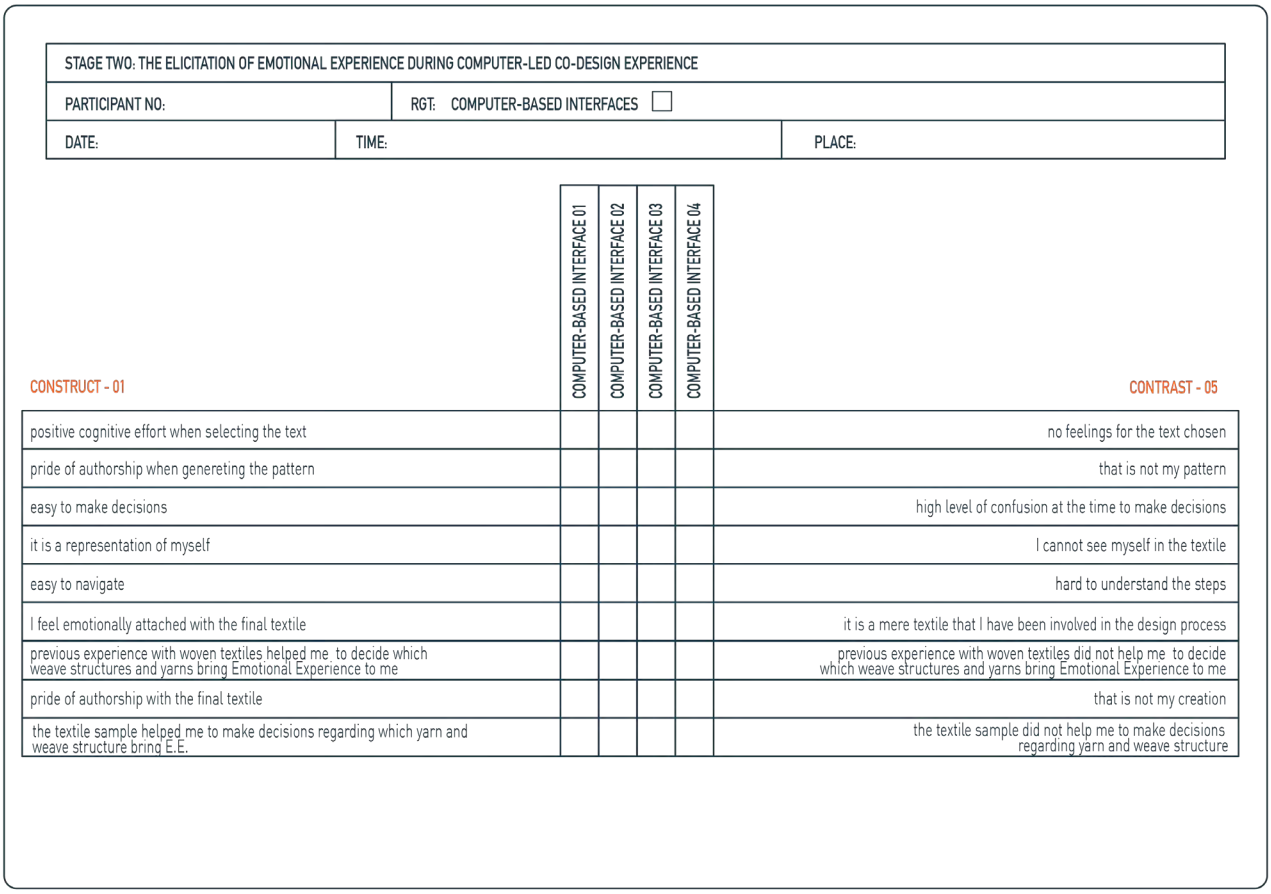


Figure 4. 21. Computer-based interface four – third page.

4.2.2.2. CONDUCTING THE COMPUTER-BASED INTERFACE INTERVIEW

While Stage One focused on the sensory perception of textile samples, it also allowed participants to familiarise themselves with the properties of woven textiles before interacting with the computer-based interfaces. It was important for the practical investigation that the first encounter with the computer-led co-design experience was through the materiality of the textiles in order to export their sensorial experiences to the computer-based interfaces.

The elements of Stage Two were four computer-based interfaces (section 4.2.2.1). The participants were invited to a one-to-one RGT interview, where they interacted with each computer-based interface to design a textile in each interface, creating a total of four textiles. Contrary to Stage One, the participants did not create the RGT bi-polar constructs and instead they were created based on the literature review. Presenting the RGT bi-polar constructs favoured Stage Two by focusing on the specific situation of participant's perception of the co-design process using computer-based interfaces. Figure 4.22 shows the RGT bi-polar construct presented in this RGT interview.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: | RGT: COMPUTER-BASED INTERFACES ☐

DATE: | TIME: | PLACE:

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text					no feelings for the text chosen
pride of authorship when genereting the pattern					that is not my pattern
easy to make decisions					high level of confusion at the time to make decisions
it is a representation of myself					I cannot see myself in the textile
easy to navigate					hard to understand the steps
I feel emotionally attached with the final textile					it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me					previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile					that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.					the textile sample did not help me to make decisions regarding yarn and weave structure

Figure 4. 22. Stage two RGT bi-polar constructs.

The participants were introduced to the topic of the interview and their role was explained during the session. They were informed that they could have breaks or ask questions during the RGT interview. First the participants interacted with each computer-based interface, starting with interface one and finishing with interface four. Each computer-based interface had an input and output section, and a selection choice area. The input of each computer-based interface consisted of introducing a text, where the interface translated into an abstract pattern using ASCII or random codes (section 4.2.2.1), then the participant was able to select yarns, weave structures, and size of the pattern. The interfaces were assisted by a textile

guide. The textile design of each computer-based interface informed Stage Three of the research practice.

Once the participant had interacted with each computer-based interface, they were then presented with the RGT bi-polar constructs. The participant reflected on their interaction with each computer-based interface by scale-rating them from 1 to 5. The participant was asked if the computer-based interface was similar to the construct or contrast of each RGT bi-polar construct. If the computer-based interface was perceived closer to the construct it was given number 1, on the contrary if it was perceived closer to the contrast then it was given number 5. When the computer-based interface did not have any connection to the construct or contrast then it was rated number 3. Finally, number 2 and 4 represented being similar to the construct or contrast respectively.

4.2.3. STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

The RGT topic of the final stage, the *Computer-led co-design experience process and outcome,* consists of two interviews. Its purpose was to evaluate the co-designed textile and process. I invited participants to reflect on their experience during the sensory perception, the interaction with computer-based interfaces, and the actual co-designed textiles presented during the interviews. Key focuses of this stage were the materiality of the design and the process of making. This stage was participants' first physical encounter with the textiles. While the participants were involved in a sensory perception analysis of woven textiles (section 4.2.1), and a digital prototype of their design (4.2.2), they could not experience the physicality

of them until Stage Three due to the nature of the practice of handweaving (not instant production) and COVID-19 restrictions. To materialise their digital prototype, I acted as expert weaver (Mendini, 2015) to interpret participants' interaction with the woven textiles in the co-design process. One of my inputs during the design process was the interpretation of participants' wants in order to create the reverse of the textile. When creating the back face of the textile, it can be woven with either a double-cloth textile or single-cloth textile with loose ends at the back. During the tactile unimodal and bimodal RGT analyses of the 12 textile samples, I observed how participants interacted, touched, and moved the textile around. This helped to understand participants' behaviour and influence during the design of the back face of the co-designed woven textiles. Having participants' interaction in mind, the option of loose ends was eliminated due to the fact that it could create a high risk of damage to the textile. At the same time, a double-cloth provided the opportunity to have a similar look and feel in both sides and therefore preserve the original design as well as reassemble the sensory perception preferences of the participants. Once I decided to create double-cloth textiles, I conduct a testing of yarns and weave structures (Figure 4.23).

Figure 4. 23. Test of weave structures and yarns.

During the first interview, conducted through RGT method, the objective was to evaluate four co-designed textiles based on the interaction with the four computer-based interfaces during Stage Two and the RGT bi-polar constructs from Stage One. The second interview, using an in-depth online video call interview method (section 3.2.3.1.2), reflected the insights and conversations carried out during the first interview of Stage Three. The co-design process at this stage evidenced the importance of using a multi-method triangulation to capture participants' responses, create spaces for reflection, and elaborate the iterative participatory practice.

4.2.3.1. FOUR CO-DESIGNED TEXTILE SAMPLES

The four co-designed textile samples were a combination between Stage One and Stage Two. After the sensory perception analysis and the interaction with the four computer-based interfaces, the participants selected yarns and weave structures, as well as text and code. Based on their responses and the data gathered from the RGT interviews of Stage One, four co-designed textile samples were woven using the TC-1 loom (Appendix J).

The research confirmed whether participant's choices were in line with the sensory perception analysis in Stage One. Participant D and F did not have changes in any co-designed textile samples as their choices matched with their sensory perception analysis. On the contrary, the other participants' choices experienced some modifications in accordance with their sensory perception analysis. Although some co-designed textile samples were modified, the changes were minimal, where only a yarn or weave structure was replaced for another option. For instance, participant B's co-designed textile sample 3 experienced a modification from the

participant's choice; however, the only difference was that instead of using a sateen weave structure to represent the white squares, a half basket weave structure was used (Table 4.1).

AL > ALPACA
AN > ANGORA
L > LINEN
M > MERINO
S > SILK

D > DIAMOND
H > HERRINGBONE
HB > HALF BASKET
T > TWILL
SA > SATEEN

	PARTICIPANT'S CHOICE: CO-DESIGNED TEXTILE SAMPLE 01				FINAL CO-DESIGNED TEXTILE SAMPLE 01				PARTICIPANT'S CHOICE: CO-DESIGNED TEXTILE SAMPLE 02				FINAL CO-DESIGNED TEXTILE SAMPLE 02			
	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □
PARTICIPANT A	S	T	M	SA	S	T	M	H	C	SA	M	HB	AL	H	M	HB
PARTICIPANT B	S	T	M	SA	S	T	M	SA	L	SA	C	D	C	SA	S	D
PARTICIPANT C	M	SA	S	T	S	SA	M	T	S	HB	C	H	S	HB	C	H
PARTICIPANT D	M	SA	S	T	M	SA	S	T	L	D	AL	HB	L	D	AL	HB
PARTICIPANT E	S	T	M	T	S	T	M	T	L	D	C	D	L	D	C	D
PARTICIPANT F	M	T	M	SA	M	T	M	SA	S	HB	C	H	S	HB	C	H
PARTICIPANT G	M	SA	S	SA	M	S	S	SA	AL	HB	L	T	L	HB	L	T
PARTICIPANT H	M	T	S	T	M	T	S	SA	AN	D	S	HB	S	D	AN	HB

	PARTICIPANT'S CHOICE: CO-DESIGNED TEXTILE SAMPLE 03				FINAL CO-DESIGNED TEXTILE SAMPLE 03				PARTICIPANT'S CHOICE: CO-DESIGNED TEXTILE SAMPLE 04				FINAL CO-DESIGNED TEXTILE SAMPLE 04			
	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □	YARN ■	WEAVE STRUCTURE ■	YARN □	WEAVE STRUCTURE □
PARTICIPANT A	M	T	S	SA	M	T	S	SA	AL	SA	M	HB	AL	SA	M	D
PARTICIPANT B	S	SA	M	SA	S	SA	M	HB	L	T	L	H	L	T	L	H
PARTICIPANT C	S	SA	S	T	S	SA	S	T	L	H	C	SA	L	H	C	SA
PARTICIPANT D	S	T	M	T	S	T	M	T	S	H	AN	SA	S	H	AN	SA
PARTICIPANT E	S	SA	M	SA	AN	T	M	T	S	HB	AN	H	C	HB	AN	H
PARTICIPANT F	M	T	M	SA	M	T	M	SA	L	T	S	H	L	T	S	H
PARTICIPANT G	M	SA	S	SA	M	T	S	SA	L	D	C	H	L	D	C	H
PARTICIPANT H	M	SA	M	T	M	SA	M	T	AL	SA	L	HB	AL	SA	L	HB

Table 4. 1. Participant's choice of co-designed textile samples vs final co-designed textile sample.

4.2.3.2. STAGE THREE REPERTORY GRID TECHNIQUE INTERVIEW

During the first interview of Stage Three, I presented the RGT bi-polar constructs that the participants created during Stage One, the RGT bi-polar constructs from Stage Two alongside various additional ones to gain a more comprehensive analysis. The session was divided in three sections: first a tactile unimodal analysis, second a visual unimodal analysis and third a tactile-visual bimodal analysis. The purpose of this interview was to determine which weave structures, yarns, text and code elicited an Emotional Experience.

At the start of the interview, the participant received instructions regarding the RGT interview and it was reminded to them that they could take a break and ask questions at any point of the interview. As with the previous interviews, the co-designed textile samples were presented on a white background. During the tactile unimodal analysis (Figure 4.24), the participant was blindfolded and was requested to use hand sanitiser to protect the textile samples. During the visual unimodal analysis the participant was not allowed to touch the textiles; and during the tactile-visual bimodal analysis the participant did not have any restrictions at the time of interacting with the co-designed textile samples.

As the participant did not have to create the RGT bi-polar constructs, each textile was evaluated separately and given a scale-rating from 1 to 5 to associate the RGT bi-polar constructs. The participant was asked if the co-designed textile sample they were analysing was similar to the construct or contrast of each RGT bi-polar construct. If the co-designed textile sample was perceived closer to the construct it was given number 1, on the contrary if it was perceived closer to the contrast then it was given number 5. When the co-designed textile sample did not have any connection to the construct or contrast then it was rated number 3. Finally, number 2 and 4 represented being similar to the construct or contrast respectively.

Figure 4. 24. Participant evaluating a textile using textile sense for session one of stage three.

During the session, the participant reflected on the past stages from the sensory perception and computer-led co-design experience. As the objective of the session was to decide which of the four co-designed textile samples best elicited Emotional Experience and if changes were needed, to prevent misunderstanding, the RGT interview ended with a conversation to decide which yarns, weave structures, text, and code best elicited an Emotional Experience. The results from this RGT interview provided the information to produce the final co-designed textile. The average duration of the session was an hour.

4.2.3.3. FINAL CO-DESIGNED TEXTILE

Based on the previous interactions with the participants to co-design the woven textile, I collaborated with TextielLab to produce the final textiles (Figure 4.25). As the research was to

be conducted within a three-year period, the collaboration with TextielLab was planned early on in the research. TextielLab collaboration helped the research to produce the final co-designed textiles in a big scale using industrial looms to reduce the time-consuming nature of weaving with the TC-1 loom.

Figure 4. 25. TextielLab production of the eight final co-designed textiles.

Due to the collaboration with TextielLab, the final textile looked slightly different as the yarns were provided by TextielLab and the warp's density was different to that of the TC-1 loom. All the textiles were lighter, whiter, and bigger in size (167 x 70 cm) than the co-designed textile samples (15 x 30 cm) (Figure 4.26). The participants noticed the difference between the co-

designed textile samples using the TC-1 loom and the final co-designed textile made in TextielLab.

Figure 4. 26. Participant D final co-designed textile details.

Table 4.2 shows participants' preferences for their final co-designed textile. Only participant A and H were not satisfied with the yarns and weave structures of any of the four co-designed woven textile samples and instead chose a new combination of yarns and weave structures for the final co-designed textile. The rest of the participants selected one of the co-designed textile sample combinations (Appendix K).

	TEXT		EMOTIONAL CONNECTION		DIGITAL CODING		SIZE			BLACK SQUARES		WHITE SQUARES	
	WRITTEN	READ	WITH	WITHOUT	ASCII	RANDOM	SMALL	MEDIUM	LARGE	YARN	WEAVE STRUCTURE	YARN	WEAVE STRUCTURE
PARTICIPANT A		●	●			●	●			S	T	M	SA
PARTICIPANT B	●		●		●		●			L	H	L	T
PARTICIPANT C		●	●		●			●		S	SA	S	T
PARTICIPANT D	●		●		●				●	M	SA	S	T
PARTICIPANT E		●	●		●		●			C	D	L	D
PARTICIPANT F		●		●		●			●	M	T	M	SA
PARTICIPANT G	●		●		●		●			M	HB	S	T
PARTICIPANT H	●		●		●			●		S	T	AN	SA

AN > ANGORA
C > COTTON
L > LINEN
M > MERINO
S > SILK

D > DIAMOND
H > HERRINGBONE
HB > HALF BASKET
T > TWILL
SA > SATEEN

Table 4. 2. Characteristics of participants' final co-designed textiles.

4.2.3.4. STAGE THREE IN-DEPTH ONLINE VIDEO CALL INTERVIEW

This interview aimed to determine whether the final co-designed textile elicited an Emotional Experience on the participant. The initial intention for this interview was to proceed with the one-to-one in-person RGT approach; however, the plan had to be adapted due to COVID-19 restrictions. The participants were informed in advance that the interviews would have to continue online, and all agreed to the new approach.

The new approach had to provide similarities to the RGT approach: (i) be conducted qualitatively, (ii) provide a space for sensory perception analysis and reflection, (iii) be able to reflect to previous interviews, (iv) be able to complement the multi-method triangulation as well as (v) follow the university and government COVID-19 guidance. An in-depth online video call interview was considered to fulfil the needs of this session and participants would receive the co-designed textile by post.

The participants were informed that the in-depth online video call interview would consist of a set of questions divided into the following categories:

- *Sensory perception*:
  - How does the textile feel to you?
  - Does it remind you of anything particular?
  - Does it elicit an Emotional Experience in you when touching it?
  - How does the textile look to you?
  - Does it remind you of anything?
  - Does it elicit an Emotional Experience in you when looking at it?
  - Which analysis (tactile or visual) gives you more information?
  - Which analysis helps the elicitation of an Emotional Experience through the textile?

- *Computer-led co-design experience*:
  - How do you feel being part of the co-design process?
  - Do you feel you designed it yourself? Or was it a co-design process? Or do you feel you only participated in the project?
  - Do you think your voice was heard during the co-design process?
  - If you feel you co-designed the textile, did that process help to elicit an Emotional Experience?
  - Does the textile reflect your personality?
  - Did you experience any creative achievement throughout the process?
  - To co-design the textile this research has used a computer-led co-design experience. (*definition:* interface-based co-design is the democratic collaborative design approach in which the non-designer plays an active role via offline digital computer tools, where the non-designer is the beneficiary of the final output)**.** Do you think that the process that you experienced aligns with this definition?

- *Digital coding*:
  - Does the translation of this text into a pattern have a positive impact on the textile?
  - Does the materiality of the text (through coding and textile) elicit an Emotional Experience?
  - Does the look of the code (squares) remind you of digital coding aesthetics?
  - Does knowing that the pattern is generated through digital coding by translating your text elicit Emotional Experience?
  - Does the text elicit in you Emotional Experience?
  - After having the textile in your hands and having completed the process, would you change your text, yarns or weave structure?

- *Participant's feedback*:
  - Do you have anything else to add that you think might benefit the research?

To conduct the in-depth online video call interview, the participant received a box with the final co-designed textile and a hand sanitiser (Figure 4.27). The final co-designed textile was protected with a bag to prevent any initial visual contact. The participant received instructions to not open the box until the time of the interview. During the interview the structure of the session was explained, and it was made clear again that asking questions or for a break was welcome.

Figure 4. 27. Participant's package for the last session.

Participants' responses during this interview reflected the overall practice and informed as to whether the computer-led co-design experience helped to elicit Emotional Experience on the co-designed textile. The research also analysed which elements of the process had a higher impact (section 5.3). Although using this method was not initially intended to be used during the inception of the research, it contributed to the research in its semi-structured interview format, where the conversations between researcher-designer and participant reflected more on the overall process as well as the participatory elements of the practice.

4.3. CONCLUSION

The chapter has presented the application of the multi-method qualitative approach during the design phase of the computer-led co-design experience of a co-designed woven textile to elicit Emotional Experience. It has introduced the following elements of analysis:

- *12 woven textile samples*: presented the rationale behind the design and selection of yarns and weave structures. Karana's et al. (2014) research provided the technical factors of analysis.
- *Four computer-based interfaces*: developed four computer-based interfaces based on Thallmaier's (2015) research, alongside Eriksen (2016), Hal Watts et al. (2014), D. Molnar & C. Molnar (2018) and my previous work to create a space for analysis of the elements of the co-design process.
- *Four co-designed textile samples*: based on previous stages of the practice four co-designed textile samples were presented to the participants to determine which

elements of the textiles and computer-based interfaces helped the elicitation of Emotional Experience.

- *One final co-designed textile*: collaborated with TextielLab to produce the final co-designed textile to analyse whether through the computer-based co-design experience the textile elicited Emotional Experience.

The chapter has also described the requirements of being involved in the research as participant, such as language and background as well as the three stages of the participatory practice, composed by:

- *Sensory perception*: analysed participants' sensory perception via tactile unimodal analysis, visual unimodal analysis and tactile-visual bimodal analysis of woven textile samples.
- *Computer-led co-design experience*: looked at participants' responses to four computer-based interfaces, and the attributes of the interfaces that promote an embedment of Emotional Experience.
- *Computer-led co-design experience process & outcome*: focused on the process and co-design textile and its impact on eliciting Emotional Experience through the process and outcome.

The multi-method triangulation brought the capacity for the research to gather data, reflect during the making and conduct interviews at the same time as a providing a space for co-designing woven textiles. The practice is analysed and discussed in the next chapter.

5. ANALYSIS AND FINDINGS

Chapter Four has described the textile samples and computer-based interface developments and the three stages of the practice to develop a computer-led co-design experience, drawing on participants' Emotional Experience at the time to co-design digital Jacquard woven textiles. This chapter analyses the three stages of the practice as well as the sensory perception, computer-based interfaces and computer-led co-design experience process and outcome. The chapter is divided in three sections:

- *Stage One: sensory perception*: presents an overview of conducting the analysis based on the three RGT interviews and their impact on textile research. It compares participants' responses to sensory perception of woven textile samples to Schifferstein & Cleiren (2005) and Whiteker's et al. (2008) to bring new knowledge.
- *Stage Two: computer-based interface*: compares the benefits and disadvantages of computer-led co-design experience process and product (Thellmaier, 2015) based on participants' responses; it presents an ideal computer-based interface prototype to eliminate the disadvantages encountered by participants.
- *Stage Three: computer-led co-design experience process and outcome*: provides a general reflection of the process and outcome of computer-led co-design experience. It analyses the use of code's three categories to bring new insights into this research area.

5.1. STAGE ONE: SENSORY PERCEPTION

Stage One consisted of three RGT interviews, where participants were invited to analyse 12 woven textile samples using tactile unimodal analysis, visual unimodal analysis and tactile-visual bimodal analysis with a seven-day gap between interviews. The seven-day gap between RGT interviews benefited the research as participants did not associate their responses to previous interviews; instead, they focused on the sensory perception they experienced at that moment. The introduction of the seven-day gap between RGT interviews complemented Bang's (2007) study, where she conducted both tactile unimodal and tactile-visual bimodal analyses together, and the first interview influenced participants' feedback during the second interview. A factor that this stage made towards a contribution to knowledge was the three modes of evaluation. Bang (2007) stated that while Homlong's (2006) study focused on the visual elements – excluding tactile perception –, and Moody et al. (2001) used a bimodal analysis – touch and vision – in each triad, Bang (2007) presented a tactile unimodal analysis followed by a tactile-visual bimodal analysis. Thus, this research advanced previous textile investigations that used RGT as a method of analysis and contributed to textile literature by analysing both senses, touch and vision, using unimodal and bimodal analysis.

The reflective practice and design reflection brought the tools for analysis of the 48 woven textile samples to select 12 textile samples with different properties such as elasticity or temperature. Reflective tools were notetaking during the making of the 48 woven textile samples, testing qualities of yarns and weave structures, and using a radar chart. The radar chart evaluation and representation of textile's material properties was based on Karana's et al. (2009) research. By introducing a radar chart as conceptualisation and analysis of Karana's

et al. (2009) material properties, this research brought a new way of analysing textile properties using their categorisation.

5.1.1. SENSORY PERCEPTION OF WOVEN TEXTILE SAMPLES

This section presents the analysis of the sensory perception of 12 woven textile samples in twofold:

- *Connecting bi-polar constructs to Emotional Experience three-domain framework*: presents the number of RGT bi-polar constructs identified through the Emotional Experience three-domain framework in each analysis – tactile unimodal, visual unimodal and tactile-visual bimodal.
- *Participant's choices:* reflects on the usability of RGT during the textile sample analysis, and participants' preferences towards yarns and weave structures.

5.1.1.1. CONNECTING RGT BI-POLAR CONSTRUCTS TO THE EMOTIONAL EXPERIENCE THREE-DOMAIN FRAMEWORK

The three RGT interviews focused on participants' responses to sensory perception of woven textiles based on unimodal and bimodal analysis using touch and vision. Each participant created six RGT bi-polar constructs per interview, with a total of 18 RGT bi-polar constructs per participant, and a total number of 144 RGT bi-polar constructs produced by all the

participants. Each RGT bi-polar construct had two parts; the construct and contrast (section 3.2.3.1). For this analysis, the RGT bi-polar constructs were split between construct and contrast, and both parts were analysed independently, referring to them as *RGT attributes* (Figure 5.1). The division between construct and contrast created a total of 288 RGT attributes, where 96 RGT attributes belonged to tactile unimodal analysis, 96 RGT attributes belonged to visual unimodal analysis, and 96 RGT attributes belonged to tactile-visual bimodal analysis.

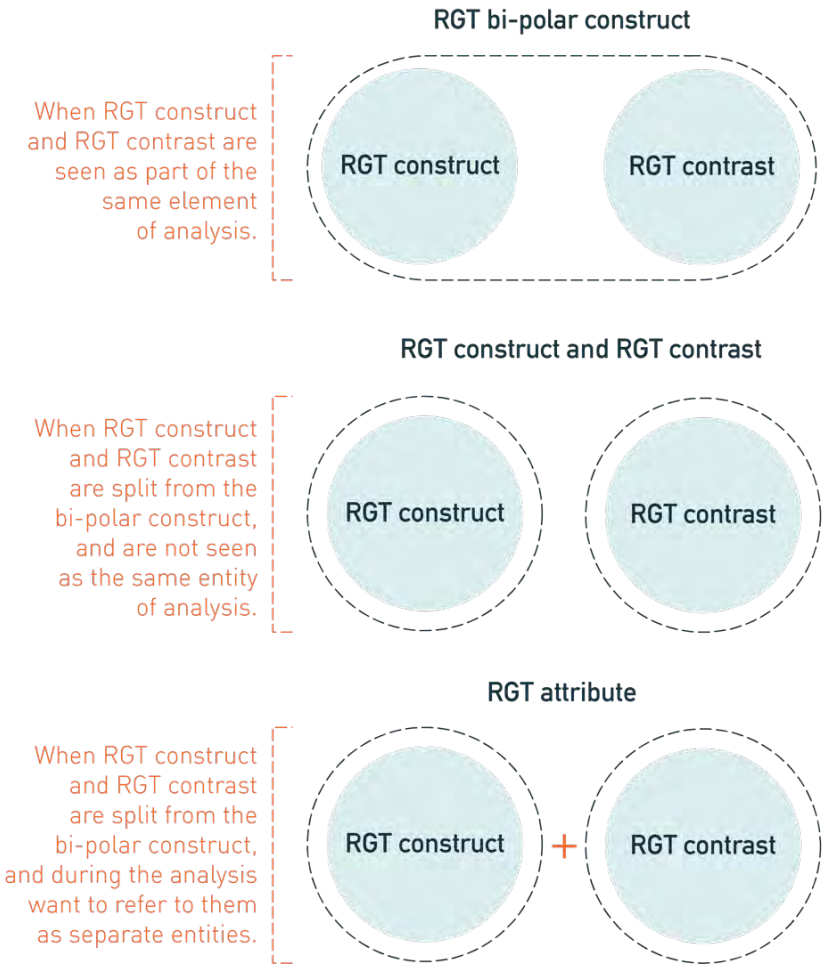


Figure 5. 1. Distinction between RGT bi-polar construct, RGT construct, RGT contrast, and RGT attribute.

The RGT attributes were divided into the Emotional Experience three-domain frameworks (section 2.1.5). To divide the RGT factors into the sensory, cognitive and emotional domains, the following considerations were applied:

- If the RGT attribute related to textile quality such as texture, yarn or colour then it belonged to the sensory domain. For example, an RGT attribute that corresponded to the sensory domain was 'I like these, personal like. Smooth' (Participant C during tactile unimodal analysis).
- If the RGT attribute showed a cognitive or mental response relating the textile to a specific situation or place, then the RGT attribute belonged to the cognitive domain. For example, an RGT attribute connected to the cognitive domain was 'something that I would buy or have it for myself' (Participant A during the tactile-visual bimodal analysis).
- If the RGT attribute showed an emotional element or connection, then it belonged to the emotional domain. An example of an emotional domain RGT attribute was 'reminds me of receiving post, nice experience' (Participant D during tactile-visual bimodal analysis).
- If the RGT attribute did not connect to the Emotional Experience three-domain framework, it was categorised as 'No connection'.

Based on the classification above, Table 5.1 shows the number of RGT attributes in each analysis and the Emotional Experience three-domain framework. As an example, when looking at the sensory domain, an RGT attribute that originated from tactile unimodal analysis was ‘texture, flatter, newer’ (Participant A during tactile unimodal analysis), one from visual unimodal analysis was ‘they look soft and silky’ (Participant D during visual unimodal analysis),

and one from tactile-visual analysis was ‘smooth and nice material’ (Participant F during tactile-visual bimodal analysis). On the contrary, an RGT attribute belonging to cognitive domain during the tactile unimodal analysis was ‘satin sofa. I have one that feels like this’ (Participant B during tactile unimodal analysis), an RGT attribute belonging to cognitive domain from the visual unimodal analysis was ‘ripples in the sand on the beach near water’ (Participant C during visual unimodal analysis), and an RGT attribute originated during tactile-visual bimodal analysis was ‘jumper like material, comfortable’ (Participant F during tactile-visual bimodal analysis). Finally, an example of an RGT attribute belonging to emotional domain originated during tactile unimodal analysis was ‘it’s too much. My dad used to dress me with stiffer materials’ (Participant G during tactile unimodal analysis), an attribute that originated from visual unimodal analysis was ‘childhood school trip’ (Participant D during visual unimodal analysis), and one from tactile-visual bimodal analysis was ‘being warm in a very cold place’ (Participant D during tactile-visual bimodal analysis).

	Sensory domain	Cognitive domain	Emotional domain	No connecion
Tactile unimodal analysis 96 attributes	34 RGT attributes	37 RGT attributes	21 RGT attributes	04 RGT attributes
Visual unimodal analysis 96 attributes	45 RGT attributes	41 RGT attributes	04 RGT attributes	06 RGT attributes
Tactile-visual bimodal analysis 96 attributes	52 RGT attributes	33 RGT attributes	10 RGT attributes	01 RGT attributes

Table 5. 1. RGT attributes based on the sensory evaluation and Emotional Experience three-domain framework.

While Whiteker's et al. (2008) research reviewed the evidence of the role of vision and touch in the perception of texture, Schifferstein & Cleiren (2005) centred their investigation on capturing product experiences using a split-modality approach. Both studies agreed that unimodal analysis had a better performance than bimodal or multi-modal analysis (Picard, 2007); however, when looking at Table 5.1, the bimodal analysis had a lower number of RGT attributes considered as 'no connection', and therefore this research argues that bimodal analysis provides a better performance when associating woven textiles to the elicitation of Emotional Experience. Possible reasons for this difference in findings compared to Whiteker's et al. (2008) and Schifferstein & Cleiren's (2005) studies was that Whiteker et al. (2008) presented a review of texture perception literature without a practice analysis, and Schifferstein & Cleiren (2005) excluded the bimodal analysis from their research. In contrast, this research identified bimodal analysis as performing better through a participatory practice-based investigation of sensory perception.

When looking at the impact of touch and vision during the sensory perception analysis, Schifferstein & Cleiren (2005) and Rubin et al. (1984) reported an inconsistency of associations to memories, people, and events between vision and touch. Their inconsistency pattern was also reflected in this research. To categorise the RGT attributes within the Emotional Experience three-domain framework, more RGT attributes belonged to the emotional domain when touch was involved during the evaluation either through unimodal or bimodal analysis. On the contrary, when vision was involved during the analysis of the sensory perception of woven textile samples, the RGT attributes were categorised to the sensory domain, paying more attention to the visual qualities of the textile samples. However, the cognitive domain presented an inconsistency of associations to specific situations and places.

While the analysis presented above focused on the RGT bi-polar constructs and their correlations to the Emotional Experience three-level framework. Table 5.2 shows the division between the modal analysis (tactile unimodal, visual unimodal and tactile-visual bimodal), textile samples, and the Emotional Experience three-domain framework. Table 5.2 shows that tactile unimodal analysis provided a higher connection to the emotional domain in each textile sample than the visual unimodal or tactile-visual bimodal. For instance, participant H created a RGT bi-polar construct during the tactile unimodal analysis, where both construct and contrast belonged to the emotional domain. When evaluating textile samples 10, 11 and 12, the construct was 'they feel similar. They should be together. Positive and negative as you don't want too much of the same thing. Too boring' and its contrast was 'I'd remove the mistress, not because she doesn't belong here.' While analysing these textile samples, participant H communicated that those textile samples reminded them of a personal situation when discovering their father had a mistress and their relationship due to the texture of one textile sample was perceived as different at the same time as being complementary to the other two textile samples.

In general, sensory perception of woven textiles had a more substantial impact on the emotional domain when evaluating them using tactile unimodal analysis. On the contrary, when vision had an active role, sensory and cognitive domains played a crucial part. This evidence reaffirms Schifferstein & Cleiren (2005) and Whiteker's et al. (2008) who state that when vision is involved during the analysis, touch complements what is perceived through that vision.

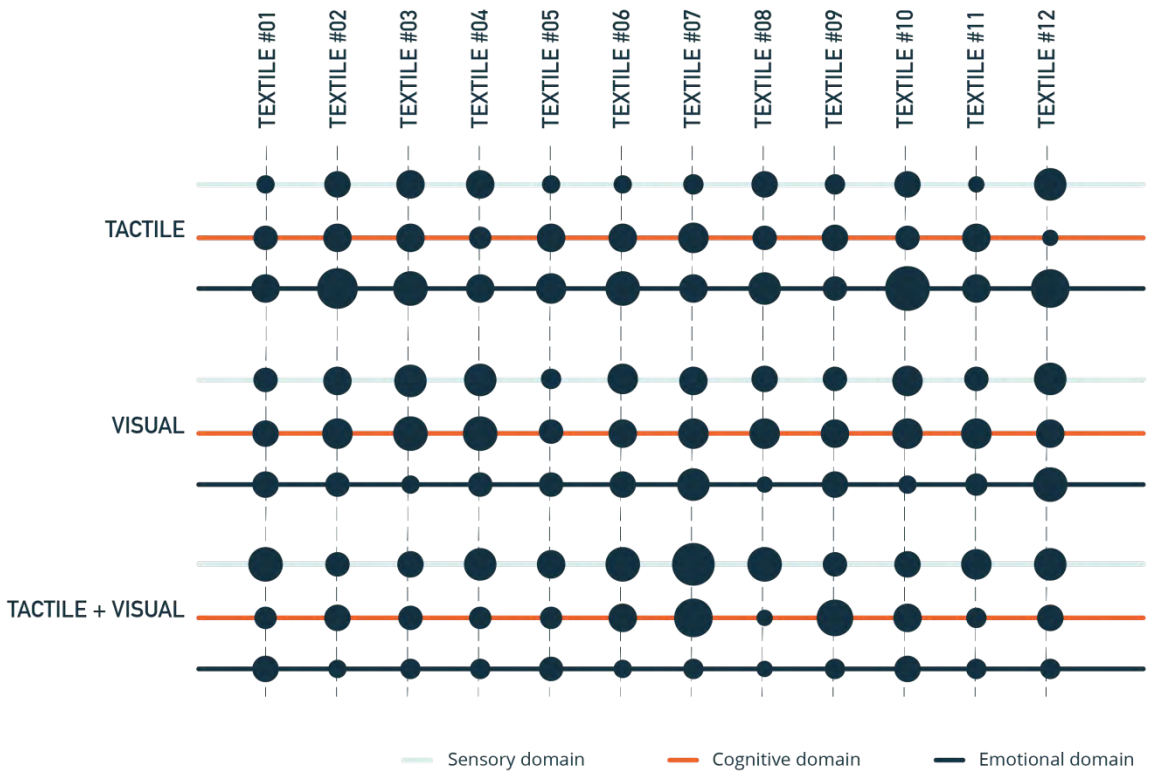


Table 5. 2. Connection between textiles, sensory properties, and Emotional Experience three-domain framework.

Whiteker's et al. (2008) points out that texture perception research that has been conducted using highly structured texture elements may not reproduce the reality of objects. In contrast, this research analysed natural undyed textile samples, more likely to be encountered in our everyday lives, which contributed to the field of texture perception.

This analysis informed the continuation of the practice and connected the textile samples to the Emotional Experience three-domain framework.

5.1.1.2. PARTICIPANT'S TEXTILE PROPERTIES PREFERENCES

This analysis aimed to discover which woven textile sample properties each participant preferred. To conduct this analysis, the RGT interviews of Stage One were analysed using the software Rep Plus, a conceptual representation software, to evaluate participant's responses towards the practice of the research. Gaines & Shaw (2018) created the Rep Plus software, and they describe it as:

> …[providing] the capability to elicit, enter, edit and analyse conceptual grid data, and to reflect back the underlying conceptual representations in graphic form. It can be scripted to offer interactive dialogs and analyses, and includes scripts for Shaw's (1980) conversational elicitation, and for the entry of grids that have been elicited through interviews and other methods (Jankowicz, 2004; Fransella et al., 2004; Fromm, 2004; Caputi, 2011). The analyses present grids in a way that reflects their meaning to promote discussion, understanding, decision-making, conflict mediation, and further elicitation. (Gaines & Shaw, 2018: 1)

The software presented various options to analyse the data, allowing the modification of the number of variables to be evaluated. Cluster analysis was the main tool of the Rep Plus software used in this research. The cluster analysis consisted of grouping similar RGT elements together. First, the software used a focus algorithm to rearrange the grid and group similar scale-rated RGT bi-polar constructs and RGT elements. Then the RGT bi-polar constructs eliciting Emotional Experience were connected to the RGT elements. Next, the focus algorithm rearrangement of the grid was used to associate the RGT elements, concentrating on the number of attributes eliciting Emotional Experience in each RGT element (Figure 5.2.). Through this analysis, I determined participants' textile preferences and selected the textile samples with high or optimal connection to attributes with Emotional Experience, allowing the continuity of the practice.

PARTICIPANT D - FIRST RGT INTERVIEW OF STAGE ONE

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT D | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 05.11.2019 | TIME: 11 AM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
Clothes that I have owned. Trausers that they look nice but to hot to wear them	4	5	4	3	4	3	4	5	4	1	4	1	I don't like it, the fabric feels like sketching my nails an a blackboard
I don't like them, school uniform. Itchy and horrible clothes	2	1	2	5	1	2	4	1	2	2	2	5	Outside of a coat. I'm not sure what this is. I've never encountered it
Clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	1	4	2	4	3	1	4	4	3	3	4	4	Discomfort, comfortable old cushion. Not related to each other, rougher
These are not eliciting any emotional reaction. Similar in one side	3	3	3	1	2	1	4	3	2	3	3	5	Nice bag, old cushion. It feels comfortable and familiar
These feel itchy, the touch is horrible	3	1	2	3	2	3	4	1	2	2	2	5	Feels comfortable. I'd have a cushion pillow made of this
Comfortable grandmother's sofa	1	2	2	3	1	2	4	2	2	4	1	5	It feels more real

PARTICIPANT D - FIRST RGT INTERVIEW OF STAGE ONE
CLUSTER ANALYSIS & EMOTIONAL EXPERIENCE BI-POLAR CONSTRUCT ANALYSIS

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT D | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 05.11.2019 | TIME: 11 AM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 10	TEXTILE SAMPLE 06	TEXTILE SAMPLE 01	TEXTILE SAMPLE 11	TEXTILE SAMPLE 03	TEXTILE SAMPLE 09	TEXTILE SAMPLE 05	TEXTILE SAMPLE 02	TEXTILE SAMPLE 08	TEXTILE SAMPLE 04	TEXTILE SAMPLE 07	TEXTILE SAMPLE 12	CONTRAST - 05
Clothes that I have owned. Trausers that they look nice but to hot to wear them	5	3	2	2	2	2	2	1	1	3	2	5	I don't like it, the fabric feels like sketching my nails an a blackboard
These feel itchy, the touch is horrible	2	3	3	2	2	2	2	1	1	2	4	5	Feels comfortable. I'd have a cushion pillow made of this
I don't like them, school uniform. Itchy and horrible clothes	2	2	2	2	2	2	1	1	1	5	4	5	Outside of a coat. I'm not sure what this is. I've never encountered it
Comfortable grandmother's sofa	4	2	1	1	2	2	1	2	2	2	4	5	It feels more real
These are not eliciting any emotional reaction. Similar in one side	3	1	3	3	3	2	2	3	3	1	4	5	Nice bag, old cushion. It feels comfortable and familiar
Clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	3	1	1	4	2	3	3	4	4	4	4	4	Discomfort, comfortable old cushion. Not related to each other, rougher

● Emotional Experience's bi-polar constructs and the scale-rating closer to them

● Textile samples with high connection to Emotional Experience's bi-polar constructs

● Textile samples with optimal connection to Emotional Experience's bi-polar constructs

Figure 5. 2. Top) Participant E RGT interview sheet of stage one's third interview. Bottom) Participant E cluster analysis & Emotional Experience bi-polar construct analysis of stage one's third interview.

Examples of such RGT attributes include 'these are more interesting. When I was a child, I used to wear woollen skirts' (Participant F, tactile unimodal analysis RGT interview) and 'a party shinny classy dress, wearing it. Nice experience' (Participant G, tactile unimodal analysis RGT interview). Textile sample's radar charts were used to understand the commonality of technical aspects of the identified textile samples. For instance, participant E connected textile samples 2 and 10 to the following RGT attributes:

- During the textile unimodal analysis:

  ‘granny’s jumper and clothes’

  ‘teddy bear at home and the contrast’

  ‘soft baby blanket that I used to have when I was a kid’
- During visual unimodal analysis:

  ‘hessian shopping bag. Ordinary’

  ‘ordinary, thick nomadic rug’
- During textile-visual bimodal analysis:

  ‘blue blanket – rough and smooth – very comfortable’

  ‘sheep pillow I made when I was younger’

  ‘scarves that my mum has, they [textiles] remind me of her’

When looking at the textile sample’s properties (section 4.2.1.1.1), it shows, for example, that textile sample 2 had:

- High elasticity
- Softness
- Lightweight
- Low strength

- Warm temperature
- Matte
- Smoothness
- Naturalness

While textile sample 10 had:

- High elasticity
- Softness
- Lightweight
- Low strength
- Warm temperature
- Matte
- Roughness
- Manmade

Therefore, the radar charts of both textile samples showed that participant E preferred textiles with the following properties: elasticity, softness, lightweight, low strength, warm temperature, and matte. The analysis of sensory perception showed how each participant had a different pattern of connecting the textile samples to the elicitation of Emotional Experience. Table 5.3 presents the textile samples' preferences of each participant. Most participants chose textile samples 5 and 8, followed by textile samples 2, 12, 3 and 7, respectively (section 4.2.1.1.1). These textile samples were made of wool yarns and linen with textured weave structures.

	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12
PARTICIPANT A		●	●	●	●	●	●	●		●	●	
PARTICIPANT B	●			●	●	●	●	●	●	●	●	
PARTICIPANT C	●	●			●	●	●	●				●
PARTICIPANT D	●	●	●			●	●	●				●
PARTICIPANT E		●	●		●		●	●				●
PARTICIPANT F		●	●	●	●			●	●		●	●
PARTICIPANT G		●	●		●	●			●	●		●
PARTICIPANT H	●				●			●	●		●	

Table 5. 3. Participants' textile samples preferences.

Table 5.4 shows participants' preferences for textile sample's properties. Most participants preferred soft and light textured textile samples with the feeling of naturalness and low strength. On the other hand, the preferences they had for the textile samples showed that participants had an interest in rough and high textured textile samples, and the temperature and elasticity were equally divided by the participant's choice. As an example, participants A, E, F and G preferred textiles with a warm temperature, while participants B, C, D and H

preferred textile samples with a cold temperature. The participants' preferences when evaluating the sensory perception of woven textiles helped to continue the iterative practice.

	GLOSSINESS		FIBRE		SOFTNESS		WEIGHT		STRENGHT		ROUGHNESS		TEMPERATURE		ELASTICITY		WEAVE STRUCTURE	
	MATTE	GLOSSY	MANMADE	NATURALNESS	SOFT	HARD	LIGHT	HEAVY	LOW	HIGH	ROUGH	SMOOTH	WARM	COLD	LOW	HIGH	TEXTURED	NO TEXTURE
PARTICIPANT A	●			●	●		●		●		●		●			●	●	
PARTICIPANT B		●		●	●		●			●	●			●	●		●	
PARTICIPANT C		●	●		●		●			●	●			●	●		●	
PARTICIPANT D		●		●	●		●		●		●			●		●	●	●
PARTICIPANT E	●			●	●		●		●		●		●		●		●	●
PARTICIPANT F	●			●	●		●		●		●		●			●	●	
PARTICIPANT G	●		●			●	●		●		●		●			●	●	
PARTICIPANT H		●		●	●			●		●		●		●	●			●

Table 5. 4. Participants' preferences of technical aspects of textiles.

5.2. STAGE TWO: COMPUTER-BASED INTERFACE

Stage Two presented one RGT interview looking at four computer-based interfaces; focusing on the participants' perceived benefits and disadvantages of the computer-based interfaces. Participants reported that the initial interaction with textile samples during the sensory perception analysis at Stage One helped them relate their choices to previous elicitations of Emotional Experience. In addition, the participants' interaction with the four computer-based

interfaces showed that at the time to co-design a textile, they preferred a holistic by-attribute interface instead of an analytic by-attribute interface, contradicting De Bellis et al.'s (2019) findings, where they stated that Western culture typically preferred analytic by-attribute interface, while Eastern culture tended to choose holistic by-attribute interface.

A collaboration with a computer engineer to develop the four computer-based interfaces was planned as part of Stage Two. The collaboration brought a cross-disciplinary technical vocabulary, where technical terms were defined and described to eliminate miscommunication when developing the interfaces. In addition, for better communication, visual graphics were present during the discussions (Figure 5.3), reaffirming Nova's (2020) work when stating that elements of the design process could be applied within design research.

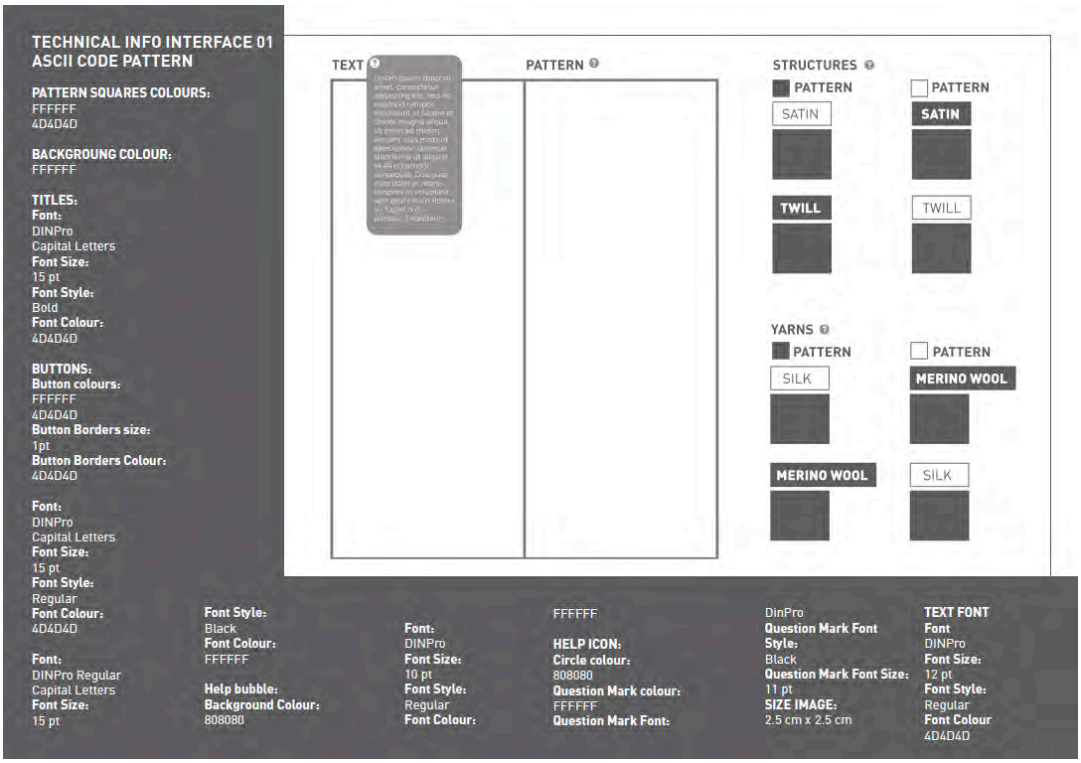


Figure 5. 3. Visual communication during the collaboration with the computer engineer.

5.2.1. COMPUTER-LED CO-DESIGN EXPERIENCE

To conduct the computer-led co-design experience's analysis, the participants scale-rated their interaction with four computer-based interfaces based on pre-determined RGT bi-polar construct by myself as designer-researcher. The RGT bi-polar constructs were designed according to Thallmaier's (2015) benefit and disadvantages of process and outcome, looking at preferences of fit, uniqueness, self-expression, enjoyment, creative achievement, pride of authorship, level of confusion and cognitive effort. Table 5.5 relates each RGT attribute to either benefit or disadvantage of process and outcome.

	BENEFIT - PRODUCT	BENEFIT - PROCESS	DISADVANTAGE - PRODUCT	DISADVANTAGE - PROCESS
positive cognitive effort when selecting the text		●		
no feelings for the text chosen				●
pride of authorship when genereting the pattern		●		
that is not my pattern				●
easy to make decisions		●		
high level of confusion at the time to make decisions				●
that is a representation of myself	●			
I cannot see myself			●	
easy to navigate		●		
hard to understand the steps				●
I feel emotionally attached with the final textile	●			
it is a mere textile that I have been involved in the design process			●	
previous experience with woven textiles helped me to decide which weave structures and yarns elicit Emotional Experience		●		
previous experience with woven textiles did not help me to decidewhich weave structures and yarns elicit Emotional Experience				●
pride of authorship with the final textile	●			
that is not my creation			●	
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.		●		
the textile sample did not help me to make decisions regarding yarn and weave structure				●

Table 5. 5. Associations of the bi-polar construct to Thallmaier's (2015) presentation of benefits and disadvantages of product and process.

Once the participant had scale-rated each computer-based interface, then the information was processed using Rep Plus software (Appendix F). Similar to Stage One, cluster analysis was the primary tool of the Rep Plus software used. Then I used the focus algorithm rearrangement of the grid as starting point to associate the RGT elements, concentrating on the number of attributes related to the benefits of process and outcome of the computer-based interfaces. Through this analysis, the categorisation of benefits and disadvantages of each computer-based interface was created based on participants' preferences.

5.2.1.1. COMPUTER-BASED INTERFACE ONE

The benefits of computer-based interface one were:

- The text (written by the participants with emotional connotation) had a positive impact.
- The textile was considered a representation of the participant.
- The holistic by-attribute interface was easy to navigate, and therefore, the participants had a better experience.
- ASCII code had a positive impact to elicit Emotional Experience.
- Sensory perception analysis helped participants to select yarns and weave structures that elicited Emotional Experience.
- The participants felt pride of authorship with the final textile.
- The presence of the textile guide helped participants to confirm their choices and significantly impacted on their final decision.

The disadvantages of computer-based interface one were:

- Participants did not perceive the pattern as theirs.
- Participants faced difficulties in making decisions due to the limited options for personalisation.

5.2.1.2. COMPUTER-BASED INTERFACE TWO

The benefits of computer-based interface two were:

- Pride of authorship when generating the pattern due to the variety of options.
- Easy to make decisions due to having a higher number of options to personalise the textile.
- The holistic by-attribute interface was easy to navigate, and therefore the participants had a better experience.
- Sensory perception analysis helped participants to select yarns and weave structures that elicited Emotional Experience.
- The participants felt pride of authorship with the final textile.
- The presence of the textile guide helped participants confirm their choices and significantly impacted on their final decision.

The disadvantages of computer-based interface two were:

- No emotional connection with the text chosen, perceiving it as a disadvantage.
- Participants did not see themselves reflected in the textiles.

- The participants felt that they were only involved in co-designing of a textile instead of aiming to elicit an Emotional Experience. Reasons for this disadvantage were the confusion to understand the steps, due to the holistic interface, the text (a text without an Emotional Experience that they had read), and the random code.

5.2.1.3. COMPUTER-BASED INTERFACE THREE

The benefits of computer-based interface three were:

- The text (read by the participants with emotional connotation) had a positive impact.
- Sensory perception analysis helped participants select yarns and weave structures that elicited Emotional Experience.
- The presence of the textile samples during sensory perception analysis helped participants confirm their choices and significantly impacted their final decision.

The disadvantages of computer-based interface three were:

- Participants did not perceive the pattern as theirs.
- Participants faced difficulties in making decisions due to the limited options of personalisation.
- Participants did not see themselves reflected in the textiles.
- Due to the analytic by-attribute interface, the participants faced a higher degree of confusion.

- The participants felt that they were only involved in co-designing of a textile instead of aiming to elicit Emotional Experience. Reasons for this were the confusion in understanding the steps due to the analytic by-attribute interface, and the random code.
- The end result of the co-design process was not perceived as their creation due to a limited involvement in the co-design process.

5.2.1.4. COMPUTER-BASED INTERFACE FOUR

The benefits of computer-based interface four were:

- Easy to make decisions due to a higher number of options to personalise the textile.
- The presence of the textile guide helped participants confirm their choices and had a significant impact on their final decision.

The disadvantage of computer-based interface four were:

- No emotional connection with the text chosen, perceiving it as a disadvantage.
- Participants did not perceive the pattern as theirs.
- Participants did not see themselves reflected in the textiles; a factor that could influence this was that the text did not represent the participants.
- Due to the analytic by-attribute interface, the participants faced a higher degree of confusion to understand the steps.

- The participants felt that they were only involved in co-designing of a textile instead of aiming to elicit an Emotional Experience. Reasons for this disadvantage were the confusion to understand the steps due to the analytic by-attribute interface and the text (a text without an emotional connection that they had read).
- Sensory perception analysis did not positively impact the participants to select the weave structures and yarns.
- The end result of the co-design process was not perceived as their creation and instead it was seen as a mere involvement in the co-design process.

5.2.1.5. IDEAL COMPUTER-BASED INTERFACE

Due to research time and financial limitation, it was not possible to have a third collaboration with a computer engineer to create a final computer-based interface that included and mixed all the benefits of the four computer-based interfaces; however, a computer-based interface prototype was created for guidance for future opportunities (Figure 5.4).

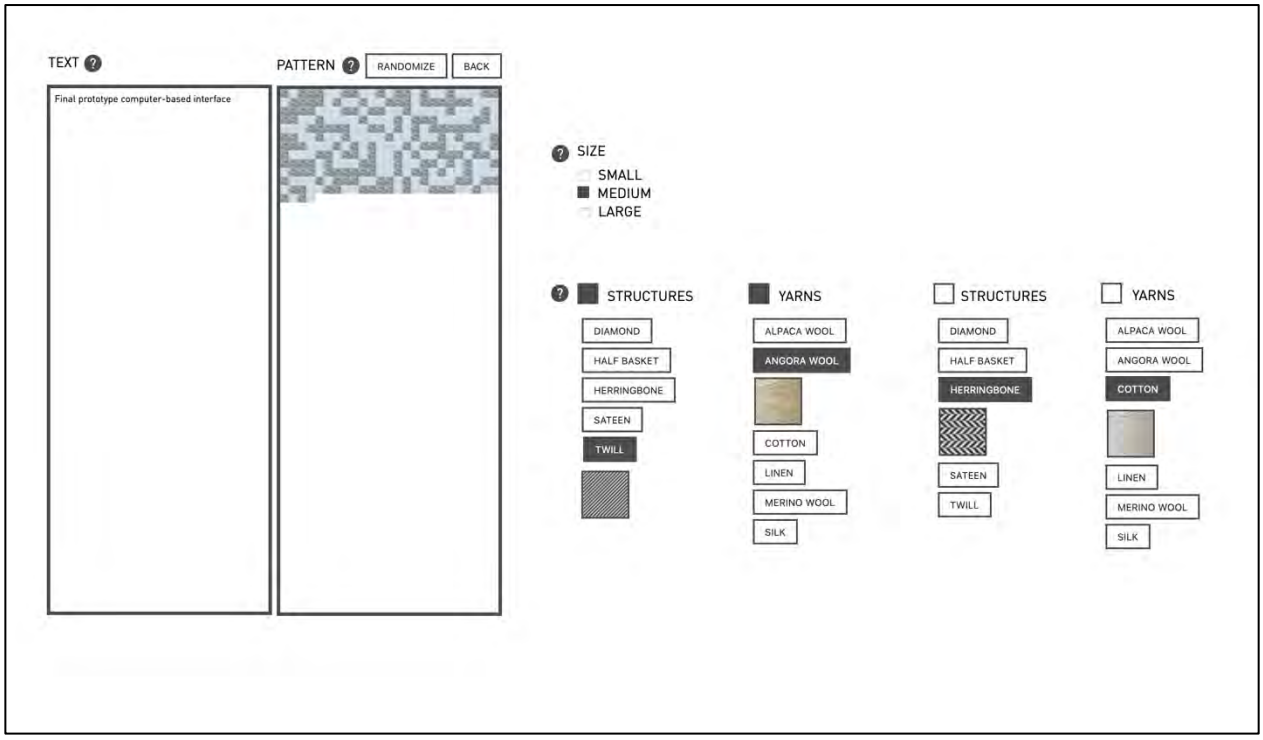


Figure 5. 4. Ideal computer-based interface.

The computer-based interface prototype consisted of:

- A holistic by-attribute interface, where participants were invited to type a text with an emotional connection.
- Initially, the text was translated using ASCII code, however, an option to change it for random code was present. The prototype added an action to reverse the random pattern.
- The computer-based interface prototype was equipped with personalisation attributes such as the size of the pattern, six types of yarns and five weave structures, that were presented with an image as well as an information section as a help guide.
- The interface was complemented by information guide in each section, the active role of the designer and a textile guide.

Through the analysis of computer-led co-design experience, the research did not intend to create generalisability within the user interface area, instead it aimed to provide a practical solution to a particular field. The small scale of participants allowed the qualitative evaluation of computer-based interfaces to understand the impact on computer-led co-design experience.

5.3. STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

Stage Three looked at the computer-led co-design experience process and outcome during both interviews. The qualitative approach allowed the research to have adaptability in the second interview, necessary because of COVID-19 restrictions. Therefore, the first interview was conducted using the RGT approach, while the second session adopted an in-depth online video call interview. While conducting the in-depth online video call interview, the online space allowed the contemplation of non-verbal communication such as the movement of the hands while analysing the textile using tactile unimodal analysis. Therefore this research agreed with Hanna (2012) when mentioning that online video calls can have almost the same advantages as face-to-face interviews.

This stage joined together participants' responses of sensory perception analysis and interaction with the computer-based interfaces. In addition, the stage required an iterative and reflective space for evaluation, reflection, and testing of the yarns and weave structures. While the RGT gathered participants' feedback, a reflective practice introduced notetaking and it brought a validation of tacit knowledge, and the design reflection provided the tools for

prototyping and testing (Appendix K). Finally, similar to Stage Two, this stage required collaboration with TextielLab, where the cross-disciplinary vocabulary, as well as the use of visual graphics, were present during the production of the final co-designed textiles.

5.3.1. PARTICIPANTS' DECISIONS

This section focuses on participant's responses towards the four co-deigned textile samples. Each textile sample corresponded to one computer-based interface's pattern. Table 5.6 shows the correlation between each textile and computer-based interfaces:

Computer-based interface one	Textile sample one
Computer-based interface two	Textile sample two
Computer-based interface three	Textile sample three
Computer-based interface four	Textile sample four

Table 5. 6. Correlation between computer-based interfaces and textiles.

The analysis of the four co-designed textile samples was conducted using the RGT approach. The interview presented the RGT bi-polar constructs created during Stage One and the RGT bi-polar construct of Stage Two, alongside additional ones, to further analyse the computer-led co-design experience of the four co-designed textile samples. The interview consisted of three analysis sections, an initial tactile unimodal analysis, followed by visual unimodal analysis and tactile-visual bimodal analysis (Table 5.7). The evaluation mode influenced most of the participants' feedback, where different co-designed textile samples elicited Emotional Experience in the function of the evaluation model. Only participants B and H showed consistency of elicitation with co-designed textile samples 4 and 1, respectively. This inconsistency in modality to elicit Emotional Experience confirmed Rubin's et al. (1984) and Schifferstein & Cleiren's (2005) findings, where exists an inconsistency of perceived information between vision and touch.

	TACTILE				VISUAL				TACTIL-VISUAL			
	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04
PARTICIPANT A		●			●		●				●	
PARTICIPANT B				●				●				●
PARTICIPANT C	●		●				●			●		
PARTICIPANT D			●		●						●	●
PARTICIPANT E			●					●		●		
PARTICIPANT F		●						●			●	
PARTICIPANT G	●	●					●				●	
PARTICIPANT H	●				●		●		●			

Table 5. 7. Participants' preferences on textile samples based on sensory perception.

Another element to extract from Table 5.7 is the tendency of participants to choose co-designed textile samples 1 and 3. As co-designed textile samples 1 and 3 were based on computer-based interface one and three, respectively, a mutual connection between these two interfaces was the text needed to have an emotional connection to the participants. Therefore, this research acknowledges and confirms the assumption that the impact of an emotional text on co-design woven textiles can elicit an Emotional Experience. While the analysis showed that both written and read texts with emotional connection can have a similar impact on eliciting Emotional Experience to the textile, all participants except one

decided to use the text they wrote. For instance, participant D shared a text message with a friend to represent something they had written with emotional connection:

> Morning Chris, I'm sorry you're seemingly in the middle of another exhausting weird period in the continuing sage of Matt and Jess. I don't like it and didn't intended for you to be a go-between. I think I'm going to leave things as they are for now (Participant D, computer-based interface one text written by them with emotional connection).

Moreover, participant B chose a text that they wrote for a university assignment that represented their culture:

> WATER is Wales asset – it's been a controversial topic for many years due to its political stance across the nation. This is because of circumstances such as the flooding of CAPEL CELYN. The flooding of Capel Celyn was took place in the 1960's to supply water for the city of Liverpool. People across all parties voted against this bill but Liverpool city council and the government in West Minister did not accept these actions. Many marches took place in Liverpool over the flooding. It is a symbol of domination of the English nation over the Welsh nation and its heritage – where Capel Celyn was the last remaining only welsh speaking village in Wales and it was felt that this was an attack on our nation. Places such as the Lake District weren't used as West Minister considered it to be of outstanding natural beauty – yet Wales is also considered as this? (Participant B, computer-based interface one text written by them with emotional connection)

The text was not embodied in the textile per se as it was encrypted using either ASCII or random codes; however, participants predominantly wanted to use ASCII code to translate the pattern back to text accurately. This analysis confirmed the role of code during the making; the code itself did not bring meaning to the textile, however when materialising the textile, it followed the grammar and politics of code (Jefferies & Thompson, 2017). Most of the participants preferred the ASCII code translating the letters consistently into pattern, however, two participants preferred the random code and focused more on the aesthetics of the pattern. As the research focused on creating a method to implement digital coding in a

co-design practice to create textiles that elicit Emotional Experience, the research invites further investigation into the politics of code.

Table 5.8 shows participants' preferences in text, code, and size. Most participants combined different options from each textile sample and computer-based interface to create a final co-designed woven textile that elicited Emotional Experience. Furthermore, participants mentioned that even though they analysed 12 textile samples and interacted with four computer-based interfaces including seeing renders of the textiles, it was not until the co-designed textile samples were materialised that they understood the connection between yarns and weave structures. This evidence demonstrates the importance of materialising ideas for participants to understand and involve them in the co-design process.

	TEXT				CODE		SIZE		
	WRITTEN	READ	WITH EMOTIONAL EXPERIENCE	WITHOUT EMOTIONAL EXPERIENCE	ASCII	RANDOM	SMALL	MEDIUM	LARGE
PARTICIPANT A		●	●			●	●		
PARTICIPANT B	●		●		●		●		
PARTICIPANT C		●	●		●			●	
PARTICIPANT D	●		●		●				●
PARTICIPANT E		●	●		●		●		
PARTICIPANT F		●		●		●			●
PARTICIPANT G	●		●		●		●		
PARTICIPANT H	●		●		●			●	

Table 5. 8. Participants' preferences on the digital coding variables.

5.3.2. PARTICIPANT'S VIEWS ON COMPUTER-LED CO-DESIGN EXPERIENCE

The final session was conducted via an in-depth online video call interview, where participants received a parcel with the textile in a bag, a hand sanitizer to use before touching the textile, and a gift to acknowledge their collaboration with the research. Seven participants received and conducted the session without any difficulties; however, participant G, who lived in Berlin, did not receive the parcel due to interruptions with the courier.

The interview aimed to collect participants' feedback on the customer-led co-design experience process and outcome. The session was divided into three parts where the designer-researcher and participants discussed three topics – sensory perception, co-design process, and digital coding – through a semi-structured question-and-answer process.

5.3.3. PARTICIPANT'S SENSORY PERCEPTION OF FINAL CO-DESIGNED TEXTILE

The online interview started with tactile unimodal analysis, where the first contact with the final co-designed woven textile was by touch. Participants were requested to put their hand inside the white bag and to not look at the textile. Participants' comments on the tactile analysis of the final co-designed woven textile were positive. The comments varied from 'it's so soft' (Participant C) to 'it feels luxurious' (Participant F) or 'it feels very, very nice already' (Participant D). These comments then changed when participants saw the textile for the first time. All of them mention the size of the textile. The participants created new associations with the textile. The associations based on visual unimodal analyses were related to specific

objects previously owned instead of the properties of the textile. The comments varied from the more conceptual example of 'it's pleasing' to one more specific to an object like the Tallit, associated with two different participants:

> I come from a Jewish family, and when you're younger. Well, I mean, at any age, but when you're younger and you take it to Sunday school, you have to wear something called Tallit, which looks like this. You were like a shawl. You must have seen in religious Jewish people. Not that I'm religious, but it was a … you know, but that's what it reminds me of. (Participant D, in-depth online video call interview)

The participants did not show a pattern regarding associating the final co-designed textile with the 12 textile samples seen/felt during Stage One's sensory perception analysis. Participants B, C and E connected the final textiles to RGT bi-polar constructs created by them during sensory perception analysis, however, participants A, D, F and H did not connect to previous RGT bi-polar constructs (Table 5.9). To confirm whether touch or vision analyses had a higher impact on eliciting Emotional Experience, during Stage Three, the participants were asked which sense helped them elicit Emotional Experience. Four participants mentioned touch helped elicit Emotional Experience, while three participants mentioned vision; therefore, an equivalent number of participants preferred either touch or vision. For instance, Participant D mentioned that visual unimodal analysis helped them associate the textile to things; however, when asked which one helped to elicit Emotional Experience, they said 'touching was just straight away' (Participant D, last interview). Another answer, by participant B, showed that tactile unimodal analysis was perceived as helpful for eliciting Emotional Experience:

> I think feeling it because you use your imagination more. Like, I didn't expect it to be white, I could feel I detect the pattern seen similar to what I was feeling, but because you don't know if it's what it is, what colour or if it's going to have a colour (Participant B, in-depth online video call interview).

On the contrary, participant H said:

> I think, visual, because when I touched it, I had to imagine in my head what it looked like. But visually, I can see all the details. We've stitched it, the different colours. I think visual gives me more information definitely (Participant H, in-depth online video call interview).

The information gathered in participants' feedback during Stage Three differed from their responses during Stage One (section 5.1.1.1). The information from Stage Three could be related to Schifferstein & Cleiren's (2005) statement that vision and touch were equally successful in providing information about the object.

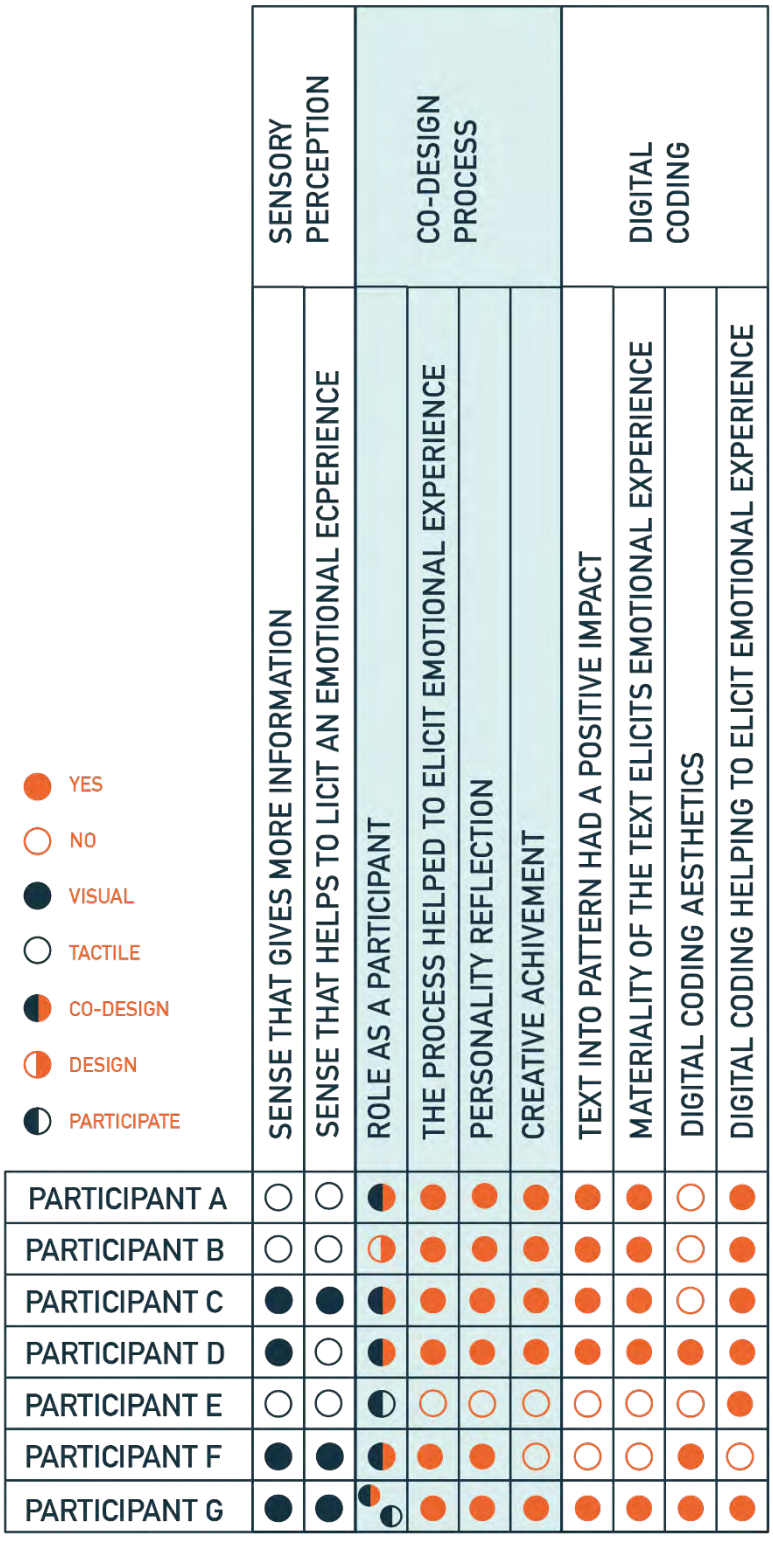


Table 5. 9. Participants' feedback during session two of stage three.

5.3.4. PARTICIPANT'S RESPONSES TO COMPUTER-LED CO-DESIGN EXPERIENCE

While Stage Two analysis of the co-design process looked at each computer-based interface, during this analysis the focus was the computer-led co-design experience. The participants were asked about the collaboration and co-design process conducted during the research practice (section 4.2.3.4). All the participants mentioned feeling active and being heard during the co-design, creating a democratic environment where their opinions and choices were valued. Participants' feedback reflected Shaughnessy's (2013) idea that the omnipotent designer is no longer omnipotent and subsequently adapting the traditional design process to embrace participatory procedures to give voice to customers.

Three participants agreed in their participation as co-designers; one participant said they felt a co-designer and participant; one participant said they were the textile designer. On the contrary, one participant said they participated in the project; however, they did not feel like co-designer. The same participant did not feel that being a co-designer or designer accomplished any creative achievement. They felt that the textile did not reflect their personality, and the co-design process did not help to elicit Emotional Experience within the textile. They stated that:

> It does elicit Emotional Experience, but I don't really know how I co-design it, so I think a lot of textiles will if they're textured, they'll elicit some little things in my house, a texture. They'll always be an Emotional Experience to touch (Participant E, in-depth video call interview).

By contrast, the other participants were positive in their feedback. They stated that the co-design process helped to elicit an Emotional Experience, and their personality was reflected within the textile based on their choices. The statement of participant A corroborated Herd's

(2012) idea of co-design customer experience, where the process cannot be separated from the product, encompassing an intangible element from the beginning of the co-design process:

> Yeah, it feels like something that I helped to make, which makes it kind of, you know, very different if it was just like a piece that you have seen somewhere. It's interesting that I know the kind of story behind it and how it was kind of put together, I guess. (Participant A, in-depth video call interview).

It allowed participants to use their creative space (Thallmaeir, 2015) as Participant B mentions:

> Yeah, I feel closer to the textile because you know that it's come from sort of partly your ideas and your imagination and because everyone thinks differently, so it's like unique to you. It's like very unlikely someone's going to have the same textile (Participant B, in-depth video call interview).

5.3.5. PARTICIPANT'S FEEDBACK ON DIGITAL CODING

This evaluation centred on the effect of digital coding within the computer-led co-design experience process and outcome. The participants were asked about the importance of code at the time to elicit Emotional Experience (section 4.2.3.4). Participants were satisfied with their initial choice of code, and none of them wanted to change their digital code after evaluating the final textile. Only participant F said that after interacting with the final textile, the only thing that they would modify would be the text itself to have a closer connection. Participant F selected a text message without any emotional component that they read 'Hi! Left you a voice message but just realised you are in America. Have a fab time!' (Participant F). They selected this text as they wanted to focus on the aesthetics of the pattern rather than

the text itself. Participant E mentioned that digital coding did not have any positive or negative effect on Emotional Experience. The participant focused their attention on the sensory perception of the textile. By contrast, when asked about the effect of the code on the final textile, Participant H mentioned

> I thought it's more the translation of the text into a pattern has a positive impact on the text. I thought it's more that than the textile for me because the text is negative. If it was a positive text probably, I would say, yeah. But because I obviously associate this text with negativity. So it's more like putting a negativity into the textile makes the text and what I'm saying more positive because it's like a kind of reflective process. Obviously, like seeing it in the coding, in the textile. I like to look at it. OK, so if I think about it more and see the textile and the shiny bits and stuff like is like pretty positive. So it's like I think, I think they actually put in the negative feelings into the textile actually tries to shift the negative into positive emotions if you go… So I think that's quite nice (Participant H, in-depth video call interview).

Participant C also mentioned the importance of code to represent the text:

> Now that I've seen the text again, because I think like before, I'll be honest, I couldn't remember exactly which one it was, but now that I've seen again and I've reread it, I'm like more emotionally attached to this because it feels, it sounds like really I don't know what the word would be like. The words are actually inside it, even though that's completely a strange thing to say. But yeah, I'm glad that I got text over the others (Participant C, in-depth video call interview).

These two quotes demonstrated how the code had its impact by encrypting text into an abstract pattern affected participants' perception of the pattern. It reaffirmed the discussion of Jefferies & Thompson (2017) and the power of code to shape the textile.

5.3.5.1. WEAVING WITH CODE

This research identified three classifications of weaving with code: the *Aesthetics of code*, *Making of code,* and *Hidden side of code* (section 2.2.4). The classification was based on Jefferies & Thompson's (2017) discussion of the back face of the textile when weaving a digital image and Clarke & Harris's (2012) analysis of how code was introduced into textile practice. The practice's outcomes of this research illustrated these three classifications. While *Aesthetics of code* referred to the representation of pixels, bits and bytes, some of the research participants expressed that they did not relate the final textile based on code aesthetics. Participant D said:

> … if I didn't see the black and white squares on the screen, I wouldn't look at that and think, it looks like that. I just think it looks like a textile pattern. (Participant C, in-depth video call interview)

Another participant mentioned that the process helped them to associate the final textile appearance to *Aesthetics of code '*a little bit. But I wouldn't have known that if I had not seen the pattern in the screen, I wouldn't have thought of it like that' (Participant B, in-depth online video call interview). The fact that participants did not correlate the final textile aesthetics to the *Aesthetics of code* offers new possibilities for further research such as the effect of colour within the *Aesthetics of code*.

Making with code related to the process of designing textiles using digital coding. In this research, the code was a core part of the design process to elicit Emotional Experience of the final co-designed woven textile. Two possible codes were presented, ASCII and random codes, where each one was used for different purposes. While ASCII code aimed to communicate a

message, random code provided aesthetics opportunities. The participants perceived these differentiations, and participant H pointed out:

> I think I did obviously feel emotional stuff and choosing the text so that this text is in the piece here now. And at the time I felt really like attached to it in the sense of I felt like I was a horrible person. Because I wrote such like stern words complaining about something, and I felt quite guilty about that because then they reply really nicely. So I definitely think I kind of deliberately used that because I wanted to feel something (Participant H, in-depth online video call interview).

And participant D also saw ASCII code as another layer to connect with the textile:

> Yeah. There's a weird added layer of tactility weirdly enough. You don't need to know the whole story. But this is a couple that I knew and that we've lost touch. And it's kind of sad. But then, you know, I was having an argument with this guy's wife, and she and I have known each other for many years. She has a blanket which is very silky soft like this. And it's a weird thing that has cropped up in all the time that we've known each other in this weird kind of soft, velvety blanket thing that she's gotten. So it's funny that I also have a very soft thing which has got her written all over it. So It's odd. Yeah, yeah, yeah, it does (Participant D, in-depth online video call interview).

This research built upon Jefferies's (2018) idea of the politics of code through participant's reflection. Although the code could not be seen, it was present and influenced the final co-designed woven textile.

The last category is the *Hidden side of code*, which referred to weaving the reverse of a digital image. While participants did not report to this category, this category validates the importance of tacit knowledge as a tool for research. As designer-researcher, I observed participants' interaction with textile samples during sensory perception analysis, and from that observation and based on their experience, I decided to create a double-cloth textile, being the back face a negative of the pattern for two reasons. First, to reduce potential damage to the textile during tactile analysis; second, to reduce confusion when looking and

touching the pattern of the textile. Although my decision as a designer informed this research in order to validate the results by protecting the integrity of the textile; it acknowledges the subjectivity and implications that this can have for future research. It corroborated Jefferies & Thompson's (2017) discussion of unlimited potential for interpretation of the reverse of a digital image. If the back face would have been a single-cloth, the results might have varied as participants would have had a different interaction with them.

5.3.6. PARTICIPANT'S SUGGESTIONS

The in-depth online video call interview ended with participant's suggestions towards the research. Among all the responses two factors were raised, the introduction of colour as part of the computer-led co-design experience and the effect of COVID-19 during the co-design process.

5.3.6.1. COLOUR

During the initial phase and planning of this participatory practice-based research, the colour factor was excluded due to the time-scope of the investigation being limited to three years and the fact that it would broaden the results. Therefore, all the natural yarns were undyed with a range of white to ecru colours used in the co-designed textile.

Five participants out of seven mentioned that colour could have been a factor that would have personalised the textile even further. For instance, participant C said:

> The only thing I would change, but then I think it would just make it more complicated. I'd add colour to add like an extra layer of so you pick the yarn, you pick the text, but it would have been nice to also be able to pick the colour. That's the only thing I think I'd add (Participant C, in-depth online video call interview).

and participant B reaffirmed this idea when saying 'the only change would be adding colour, but apart from that I wouldn't change anything' (Participant B, in-depth video call interview). Thus, this research proposes further study on the introduction of colour during computer-led co-design experience of woven textiles to elicit Emotional Experience.

5.3.6.2. COVID-19

Due to COVID-19 restrictions the research had to be adapted and consequently it also experienced a 9-month delay in the analysis of the final co-designed textile. This factor had consequences for participants' experience as well as the results of the analysis. During the evaluation of the final co-designed textiles, participants could not fully recall the options that they had selected such as text, code or weave structures. Thus, when the participants were informed of their choices the elicitation of Emotional Experience and feelings towards the final co-designed textile increased. For instance, participant B said 'the session being closer together, but with COVID-19 I think it was impossible' (Participant B, in-depth online video call interview) and participant D said 'I think well, I know it's obviously COVID. I think having them closer together, just sort of like helps the like the connections between the sessions

easier, but it's obviously not your fault' (Participant D, in-depth online video call interview). Although it was an inevitable situation, it informed the research of the importance of time-scale during computer-led co-design experience.

5.4. DISCUSSION AND CONCLUSIONS

This chapter has discussed the analysis and findings of the computer-based co-design experience of co-designed woven textile to elicit Emotional Experience. The results from the practice investigation were analysed according to its three areas:

Stage One: sensory perception contributed to the texture perception literature by analysing textile samples that can be seen daily opposed to the tendency of presenting highly structured elements that might not be reproduced in objects (Whiteker's et al., 2008). The investigation contributed to Schifferstein & Cleiren's (2005) work as well as Whiteker's et al. (2008) investigation by pointing out the impact of bimodal analysis to elicit Emotional Experience of woven textiles. The research discussed the impact of touch and vision on unimodal and bimodal analyses, determining that RGT attributes during tactile unimodal analysis provided higher connection to emotional domain than when vision was involved during the analysis of sensory perception. To advance the practice investigation, another element that the analysis identified was that most participants preferred soft and light textured textile samples with the feeling of naturalness and low strength; this information informed the four co-designed textile samples.

Stage Two: computer-led co-design experience presented a discussion regarding participants' responses towards the interaction with the four computer-based interfaces. Presenting the RGT bi-polar constructs during the RGT interview helped the research to capture the benefits and disadvantages of process and outcome (Thallmaier, 2015) of each computer-based interface. The analysis provided a prototype of computer-based interface presenting the attributes and layout for a better computer-led co-design experience. Oppose to De Bellis et al.'s (2019) statement that western culture preferred analytic by-attribute interfaces, participants' responses informed the design of the prototype as a holistic by-attribute interface.

Stage Three: computer-led co-design experience process and outcome focused on process and outcome of the four co-designed textile samples and final co-designed textile for each participant. The section reviewed participants' preferences of text and code as well as the three categories of use of code within the weaving practice. The reflections from participants demonstrated that the *Aesthetic of code* was perceived during the interaction with the computer-based interfaces as they presented a clear distinction using colour and black & white, however, when the digital pattern was woven using undyed yarns and weave structure, the perception of code was more subtle or inexistent.

Regarding the *Making of code*, the findings corroborated Mitchell's (2012) idea of the textile becoming a kind of speaking, and for language a kind of making, where the encoded text is the language to create an abstract pattern, and the materiality of the textile brought the text back. Participants preferred the use of ASCII code at the time to translate their text into an abstract pattern, pointing out the importance of the text's representation on the final textile to elicit Emotional Experience. In addition, the findings expanded the idea of Jefferies's (2018),

where existed a grammar and politics of the code. Even though the code was not seen, it translated the inputs differently creating two different outcomes, influencing participants' elicitation of Emotional Experience.

Hidden side of code was reflected in the lack of information of the digital pattern to create a back face. This required my expertise in weaving, tacit knowledge, and reflective practice to interpret the reverse of a digital pattern. Creating a double-cloth textile, where the back face was the negative of the front face minimised the risk of damage during the tactile analysis. This category corroborated Jefferies & Thompson (2017) discussion of unlimited potential for interpretation of the reverse of a digital image. This research recognised the subjectivity during the making of textiles, based on trial and error, and aimed to promote further discussion and create new knowledge.

6. CONCLUSION

This chapter presents the conclusions, contributions and limitations of the study alongside the introduction of future opportunities. First, it summarises the research, followed by a personal reflection and evaluation, contributions to knowledge and limitations, finishing with opportunities for future research and applications to the industry.

6.1. SUMMARY

This research has investigated co-design within Jacquard woven textiles using digital coding to elicit Emotional Experience. The research has designed and tested a participatory method through a practice-based inquiry, where both agents – designer-researcher and participant – have had an active role during the design process. As designer-researcher, I have adopted a role of expertise in textiles, assessing participants with their choices while analysing participant's responses towards elements of the practice. By contrast, the participants have brought their own expertise in the area of past experience and personal choices, an intrinsic factor for eliciting Emotional Experience within the textiles. Throughout the theoretical and empirical inquiry, the purpose of this research was to answer the question: How can Emotional Experience be designed within digital Jacquard woven textiles using digital coding as a co-design tool?

Through the literature review (Chapter Two), current debates about Emotional Experience, digital coding within textiles, and computer-led co-design experience have been examined to

create participatory procedures within the textile practice to elicit Emotional Experience. The research context comprises of three main pillars:

- *Emotional Experience*: previous studies that contributed to this area of research from consumer behaviour, design and textiles fields were reviewed. The review revealed a connection between studies, where they distinguish three domains of Emotional Experience based on sensorial elements, cognitive reactions, and emotional factors. A commonality between these studies is the focus on proposing opportunities instead of applying a practical investigation. In contrast, this research has studied and adapted previous work to develop the Emotional Experience three-domain framework to be applied in the practice of the study. The implementation of the Emotional Experience three-domain framework allowed the designer-researcher to identify elements on the textile that could elicit Emotional Experience.
- *Digital coding within textile practice*: introduced the historical and conceptual connections that both disciplines have in common. The literature review looked at previous textile research and current textile practice that incorporates digital coding as an element of design. The research has presented three categories of digital coding within the textile practice through the literature. (i) The *Aesthetics of code* based on the visual appearance of bytes, bits and pixels; (ii) the *Making of code* based on the grammar and politics of the code and the results within the textile outcome; (iii) and the *Hidden side of code* based on the non-existing reverse of a digital image and the approach the textile practitioners adopt to develop the back face of the textile.
- *Co-design process*: looked at co-design in relation to mass-customisation, analysing the benefits and disadvantages of web-based and in-store co-design process, and

outcome alongside customer co-design experience to create a computer-led co-design experience approach. The participants of this research were invited to be involved in a computer-led co-design experience, aiming to create woven textiles that elicited Emotional Experience.

Chapter Three has presented the research methodology, taking a qualitative multi-method triangulation approach to validate the research practice and findings as well as collecting evidence for the continuity of the iterative practice. The methodology comprised of the participatory research, design research and action research approaches, outlining the elements of each method, and their implementation and adaptation to this research. The participatory research has used participants' responses to analyse computer-led co-design experience process and outcome; the design research approach has created an iterative participatory weaving practice of trial and error that informed the theory of the research; and finally, the action research approach has validated the use of tacit knowledge as well as translated it into explicit knowledge. The multi-method triangulation approach allowed the research to be conducted through the lens of a designer.

Chapter Four has presented the practice investigation divided into three stages. Stage One looked at sensory perception of 12 woven textile samples and how to elicit Emotional Experience. Through RGT, I recorded participants' reactions to yarns and weave structures. Participants' textile preferences were subsequently analysed using a radar chart analysis of textile properties (Appendix C) to inform Stages Two and Stage Three of computer-led co-design experience. Stage Two consisted of four computer-based interfaces, with which the participants interacted to design a textile in each interface that embedded Emotional Experience. The interfaces presented the opportunity to encrypt text into an abstract pattern

using two types of digital coding, ASCII and random, and select size, yarns and weave structures for the textile pattern. Stage Three looked at the computer-led co-design process and outcome. Participants analysed a set of co-designed woven textile samples and a final co-designed textile to understand the impact of the computer-led co-design experience within the design of a woven textile to elicit Emotional Experience.

The analysis and findings have been presented in Chapter Five, where the results were divided into three categories:

- *Stage One*: focused on sensory perception of woven textiles; it compared the findings with Schifferstein & Cleiren's (2005) and Whiteker's et al. (2008) investigations as well as analysing the use of RGT to capture participant's sensory perception of woven textiles. This practice-based research has argued against Schifferstein & Cleiren's (2005) statement when they identify that unimodal analysis performed better than bimodal analysis. The participants' responses of textile samples were associated to the Emotional Experience three-domain framework easily when evaluating them through bimodal analysis. In addition, by conducting tactile unimodal and visual analysis as well as tactile-visual bimodal analysis of textile's sensory perception the research has contributed to the implementation of RGT as a tool for analysis within the textile practice; and has advanced the research of Moody et al. (2001), Homlong (2006) and Bang (2010).
- *Stage Two*: based on computer-based interface; the research analysed participants benefits and disadvantages (Thallmaier, 2015) with each computer-based interface. Based on the findings of the research, the practice investigation has created a holistic by-attribute computer-based interface prototype for further investigation. Although

De Bellis et al. (2019) pointed out that western culture preferred analytic by-attribute interfaces, the participants, all British, responded better while interacting with holistic by-attribute interfaces; and therefore challenging De Bellis et al.'s (2019) findings.

- *Stage Three*: looked at computer-led co-design experience process and outcome; it presented the overall participants' elicitation of Emotional Experience during the process and outcome of computer-led co-deign experience approach. The participants of this research showed a tendency of eliciting Emotional Experience when the text chosen had an emotional connection and was encrypted using ASCII code. Thus, Jefferies & Thompson's (2017) concept of code itself does not bring the meaning of the artefact, but it is as important to the materialisation of the object due to the object following the grammar and politics of the code. The language of code is not tangible until it is seen in a physical representation like a woven textile. The physicality of the textile during Stage Three analysis was essential to connect previous stages togethers as well as materialising a digital image. It provided a broader view of the digital image by interpreting, designing, and making tangible the back face of a digital image's reverse. This was validated through the practice investigation of this research.

The results of the research provided the answer to the research question – How can Emotional Experience be designed into digital Jacquard woven textiles using coding? It demonstrated that computer-led co-design experience can create digital Jacquard woven textiles that elicit Emotional Experience:

- By inviting participants to analyse sensory perception of woven textile samples.
- By interacting with a computer-based interface to co-design a woven textile, based on the translation of text – with emotional connection – into abstract patterns using

digital coding, as well as presenting attributes for personalisation based on sensory perception of woven textiles.

- By presenting co-designed textile samples as tangible prototypes during computer-led co-design experience approach, where participants can modify and combine their selections to create a final textile enhancing the elicitation of Emotional Experience.

6.2. PERSONAL REFLECTION AND OUTCOMES

6.2.1. METHOD AND PRACTICE

The design of this practice-based research was based on a gap found in the literature review alongside pilot studies and my MA project. This section presents a personal reflection and evaluation of conducting the investigation. To conduct the research, a qualitative multi-method triangulation was designed, registering and consolidating factors of the research practice as evidence to contribute to knowledge. The qualitative multi-method triangulation was purposefully designed to create an iterative conversation between theory and practice. The iteration blended both areas, theory and practice, creating a solid methodology that naturally integrated the practice within the research context. To conduct practice-based research, I adopted a duality in roles – designer and researcher – that were constantly interchanged as well as blended. The first duality appeared early in the investigation, during the design phase of the woven textile samples to conduct Stage One. I initially acquired a designer's role looking at technical aspects of the woven textiles such as warp density, design of the draft, and yarn size (Appendix L). However, to create limitations on the research

practice, I then adopted the role of a researcher looking at previous investigations in weaving, sensory perception, and texture perception to introduce new knowledge. These crossovers and role interchanges have been present throughout the research, where during the RGT interviews with participants, I had to make clear to them – and at the same time to myself – which role I was partaking in each time. When acting as a researcher while conducting an interview I took notes; however, when acting as a designer I assisted the participants with inquiries during the computer-led co-design experience. The crossovers between both roles as well as connections between theory and practice generated a transdisciplinary process of analysis, where elements of the design practice become part of the theory, and at the same time, aspects of conducting research were integrated into the practice. For instance, graphical representations are widely used in design practice to communicate ideas as they can be more efficient than when explained with words (Nova, 2020). In the research practice, when communicating with the computer engineer and TextielLab to describe my practice, I used graphical representations to demonstrate my ideas. Soon the graphical representations were implemented in the literature review and analysis of the research practice to communicate the ideas and outcomes, being an intrinsic part of the thesis. The ability of this research to interweave these two poles – practice and theory – as well as the two roles – designer and researcher – brings new insights into weaving practice and academia. It introduces the weaving practice to elements of research such as gathering participants' responses to sensory perception of woven textiles, alongside presenting factors of the practice of weaving within academia.

6.2.2. GRAPHICAL VISUALISATION

The implementation in this research of graphical visualisation outside the research practice comes from my background and training as a designer and my visual thinking to understand and express new ideas. The graphical visualisation as an element of theory representation has been an unexpected outcome of this investigation. While attending the PhD by Design workshop at the Design Research Society Conference 2018 in Limerick, an emerging discussion occurred among other fellow PhD students when reflecting on their planning and conducting of PhD research. Those who were doing practice-based research used graphical visualisation to communicate and express their ideas in and out of the practice investigation. Manon Ménard (2021) presents two doctoral studies[44], which use graphic practices in design research to orient, express, and project oneself. Following Ménard (2021) this research's graphical visualisations have helped orient, express, and project this practice-based research in and out of academia. The flexibility of the qualitative multi-method triangulation permitted the introduction of graphical visualisation for evaluation and representation of textile technical properties, participant's textile preferences, as well as the structure of this doctoral thesis. The graphic visualisations, utilised throughout this research, have operated like weave drafts, showing the interconnection and layering of patterns of theory much like a textile is constructed.

[44] Élise Goutagny, PhD student looking at contemporary feminist and French-speaking graphic production. Karen Polesello, PhD student working on the promotion of manual work in primary school through design.

6.3. RESEARCH CONTRIBUTIONS

This research has made three contributions to textile design research. Firstly, although Emotional Experience has previously been studied from different disciplines presenting evidence on empirical studies and literature reviews, there is little research on creating a method to implement and analyse Emotional Experience during the design of woven textiles. This practice-based research presented a computer-led co-design experience approach within the textile practice that focused on designing with Emotional Experience. There is little discussion and debate in textile research regarding designing textiles that elicit Emotional Experience (Seo, 2015; Bang, 2010). The tendency is to focus on the Emotional Experience of textiles that have been acquired over the years of owning the textile (Niinimäki & Koskinen, 2011) instead of focusing on the making. By recognising this shortcoming and presenting a method that introduces digital coding as a tool to design woven textiles to elicit Emotional Experience, it opened new opportunities for future discussions and study in and out of academia. The research could inform small and big business, who aim to involve individuals in the making to design emotional-driven products. For instance, New Balance Team Sports is currently collaborating with Unmade (Hal Watts, et al., 2022) to create a web-based interface for product personalisation, and this research could inform their web-based interface to create an Emotional Experience layer to further personalise their products.

Secondly, the qualitative multi-method triangulation used during the investigation has allowed the research to explore participants' sensory perception of woven textiles and computer-based interfaces. It advanced the incorporation of the RGT within the evaluation of woven textiles, complementing previous work from Moody et al. (2001), Homlong (2006) and

Bang (2010). The natural versatility of the RGT provided the means to be adapted in each stage of the practice investigation. For instance, during Stage One participants created their own RGT bi-polar constructs, where during Stage Two and Stage Three the RGT bi-polar constructs were given by me as the designer-researcher. This presented different ways to use RGT within the analysis of Emotional Experience in textiles, which textile practitioners and academics can use and adapt to their own benefit.

Thirdly, in 2014 the UK Arts and Humanities Council (AHRC) acknowledged a move towards a mix of disciplines using digital coding within textile practice; however, it is still growing as a research discipline. This practice-based research contributes to the work of Clarke & Harris (2012), Seo (2015), Jefferies & Thompson (2017) and Stephens (2018) by presenting three categories of the use of code within the textile practice. *Aesthetics of code* relates to the use of elements of digital coding such as pixels as textile patterns. *Making of code* reflects the purpose of the code affecting the textile outcome, whether it is used for translating text or representing music. *Hidden side of code* relates to how the reverse of a digital image is materialised into the back face of a textile.

In addition, the research has contributed to the mix discipline of digital coding and textile practice by incorporating encrypted messages using digital coding to design new textiles (Eriksen, 2015; Nadal, 2016; Meech, 2016). The practice of this research has given new insights and opportunities for future studies to investigate the effects of using digital coding to translate text into abstract patterns across weaving and other textile practices. It has highlighted the impact of ASCII code when encrypting emotionally engaging text into woven textiles at the time to design with Emotional Experience. It contributed to generate new discussions and interpretations of the use of code within the weaving practice that can

influence textile practitioners, digital makers, and academics looking at the impact and possibilities of digital coding.

6.4. RESEARCH LIMITATIONS

Certain research limitations have appeared in the methodology and practice. This section presents the limitations and proposes recommendations to avoid them in future research. The ontology of this research was qualitative, in which a small number of participants were evaluated. A qualitative multi-method triangulation was adopted to validate participant's responses; while the three methods help the practice investigation fulfil its aim, one drawback emerged when conducting the practice. During the RGT interviews of Stage One, participants created their RGT bi-polar construct based on six sets of triads to evaluate 12 woven textile samples (section 4.2.1.1), in which the order of the first four sets of triads were based on the two pilot studies. However, to create the fifth and sixth RGT bi-polar constructs, I selected two new sets of triads. To create the new triads, I used participants' feedback and tacit knowledge to select two sets of three textile samples. Thus, this benefited the research by providing a flexibility for the designer-researcher to test hypothesis of which textile samples could elicit Emotional Experience by creating new combinations. However, for future investigations, this research suggests enabling participants to select the textile samples themselves, so the investigation can gain more insights into the participants' personal preferences and Emotional Experience from the outset.

Another limitation of this research was the sample of participants. The research focused on British students with a background in design courses at Manchester School of Art due to students being encouraged to develop their creativity and decision-making skills alongside undertaking multidisciplinary collaborations through their programmes' curricula (Manchester School of Art website, 2021). Thus, the students could bring new insights during the development of computer-led co-design experience. While the participants' sample served well for this research to test if the method could work as a co-design process to elicit Emotional Experience on digital Jacquard woven textiles; it may not reflect the average customer if intended to be applied for commercial purposes. For future investigation, this research suggests sampling participants with different backgrounds that fulfil a range of customer profiles.

The practice investigation had its limitations due to the nature of the weaving practice and the time it took to complete the co-designed textile samples in this research. The handweaving of the textile samples and co-designed textiles made the process slow, creating a more extended time gap between stages than expected. An option to avoid the time gap would be the use of industrial production looms instead of handweaving. By transferring the production from handwoven to industrial production, new insights of tacit knowledge could emerge as the weaving practice differs, and therefore, a different set of skills would be needed.

Due to the scope of this investigation, the sensory perceptions and computer-based interface's elements of analysis were restricted to achieve the objectives of the research. During the last interview, participants mentioned the colour element as a factor to include in further investigations as it was excluded from this research. Participants said that colour could

have helped them more easily elicit Emotional Experience as it would reflect their colour preferences. This limitation should be seen as an opportunity for further research to understand the effects of colour on Emotional Experience within the practice of weaving.

Finally, the planning of the participatory practice was based on in-person one-to-one interviews. However, due to COVID-19 restrictions limitations were placed on in-person meetings and changes to the research interviews were required. In-depth online video call interviews were used to replace in-person meetings. However, there was a 9-month delay until the analysis of the final co-designed textile could take place. This resulted in participants not fully recalling their chosen encoded text and demonstrated the importance of computer-led co-design experience time-scale.

6.5. OPPORTUNITIES FOR FURTHER RESEARCH AND PRACTICE

The research has introduced a new conceptualisation of co-designing woven textiles using Emotional Experience as a key element of the process. It has confirmed the RGT approach as a useful method in the research practice of woven textiles. In addition, there are general and specific areas presenting opportunities for further research in academic and commercial applications.

One of the novelties that the practice investigation contributed to knowledge is the introduction of Emotional Experience as an element of computer-led co-design experience. Through the analysis of different factors of the weaving practice, undyed natural yarns and

weave structures, Emotional Experience provided a three-domain framework to evaluate participants' textile preferences. However, new insights into colour can expand the impact of computer-led co-design experience to elicit Emotional Experience within the weaving practice. Another opportunity of introducing colour as an element of analysis is to expand the categories of the use of code, and provide more inputs for the effect of colour in regards the *Aesthetics of code*.

Although this research has investigated Emotional Experience as an element of design during pre-acquisition stage, in commercial environments Emotional Experience has not been seen as an instrument to be utilised in this way. The introduction of Emotional Experience as an element of the textile design process could offer opportunities for research in sustainability fashion practice. For instance, looking at the Emotional Experience that individuals experience in one, five and ten years after co-designing a textile to elicit Emotional Experience during the pre-acquisition stage could bring new opportunities for future research.

Finally, section 3.1.1 where the research discussed participants required characteristics, the effect of language in describing objects was the primary factor towards selecting solely English speakers. The research therefore proposes further investigation on the effects, similitudes, and differences of other languages than English when describing the sensory perception of woven textiles, as this would offer insight into the relationship between multiple languages and the elicitation of Emotional Experience. In addition, conducting further investigations in geographical areas beyond the UK would continue the expansion of this research.

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7. APPENDICES

7.1. APPENDIX A: PARTICIPANTS' PROFILE

PARTICIPANTS' INFORMATION CHART

Participant	Gender	Age	Course of study	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5	Interview 6
Participant A	Female	19	BA (Hons) Graphic Design	27.09.19	04.10.19	11.10.19	18.10.19	25.02.20	02.02.21
Participant B	Female	21	BA (Hons) Fine Arts	07.10.19	14.10.19	21.10.19	28.10.19	20.02.20	03.02.21
Participant C	Female	20	BA (Hons) 3D design	04.10.19	11.10.19	18.10.19	25.10.19	28.02.20	09.02.21
Participant D	Male	35	BA (Hons) Graphic Design	22.10.19	29.10.19	05.11.19	12.11.19	12.03.20	04.02.21
Participant E	Female	19	BA (Hons) Textile in Practice	24.10.19	31.10.19	07.11.19	14.11.19	20.03.20	20.03.21
Participant F	Female	24	BA (Hons) Graphic Design	23.10.19	30.10.19	06.11.19	13.11.19	12.03.20	10.02.21
Participant G	Female	26	BA (Hons) Graphic Design	25.10.19	01.11.19	08.11.19	15.11.19	13.03.20	
Participant H	Female	27	PhD Design	22.11.19	29.11.19	06.12.19	13.12.19	20.03.20	05.02.21
Participant I	Female	21	BA (Hons) 3D design	03.10.19	10.10.19	17.10.19	24.10.19		
Participant J	Male	21	BA (Hons) 3D design	02.10.19	09.10.19	16.10.19	23.10.19		

Participant withdrawn, therefore, following Ehtics procedures the data was not analysed.

Participant did not conduct the interview due to major forces or withdrawn from the research.

Table 7. 1. Participants' information chart.

7.2. APPENDICE B: PILOT STUDIES

This research conducted two pilot studies in order to assess the viability of the method and its adaptation to fulfil the aims and objectives of the research. The two pilot studies were crucial both to determine the feasibility and inform the improvement of various aspects of the research design. The two studies varied in the number of participants and the sessions undertaken. The first study determined the number of textile samples to analyse, the evaluation mode for each of the three first sessions and the longevity of each session. While the first pilot study had a broader view and analysis of the method of this research, the second aimed to accurately define each step of the practice investigation and determine how to accommodate the needs of the participants and the research.

7.2.1. PILOT STUDY ONE

During December 2018 the first pilot study was conducted with two volunteers. At that point the volunteers were invited to conduct a one-to-one interview to evaluate the textile samples using the Repertory Grid Technique (RGT), where each of them fed back the elicitation of Emotional Experience while evaluating the textile samples. Based on the research of Overvliet et al.'s (2016), the way in which the textile samples were presented and evaluated influences the perception of the individual and therefore affect the results. For parity with Overvliet et al.'s (2016) research, the session was designed to analyse the textile via tactile unimodal analysis, then visual unimodal analysis, and finally it was followed by the evaluation of the textiles using tactile-visual bimodal analysis.

In order to evaluate the textiles using the RGT, the volunteers were handed three evaluation RGT sheets, one for each mode of evaluation: tactile unimodal, visual unimodal and tactile-visual bimodal analyses. During the tactile unimodal analysis, the volunteers were blindfolded and asked to touch each textile once. Then, from the initial sensory perception, the volunteers selected three textiles to elicit the RGT bi-polar constructs. In order to elicit the RGT bi-polar constructs from their selection, they had to distinguish two that looked alike in terms of the elicitation of Emotional Experience, and one that looked different. The two that looked alike was the construct and the one that looked different was the contrast. This information was then added to the first evaluation sheet. The process was repeated four times. After that, the second part of the session started.

Next the volunteers had to scale-rate the textiles to their RGT bi-polar constructs. Touching the first textile sample, they had to rate it from 1 to 5 depending on whether that textile was closer to the construct or contrast. The Scale-rating consist of the following:

- If the textile felt completely similar to the construct, then it would receive number 1.
- If the textile felt completely similar to the contrast, then it would receive number 5.
- If the textile was neutral or not related to the bi-polar construct, then number 3.
- If the textile was close to the construct, then it would receive number 2
- and if the textile was close to the contrast, then it would receive number 4.

The volunteers then analysed the following 12 textile samples. After the tactile unimodal analysis, the volunteer proceeded to do the same using only the visual unimodal analysis and again for the tactile-visual bimodal analysis (Table 7.2).

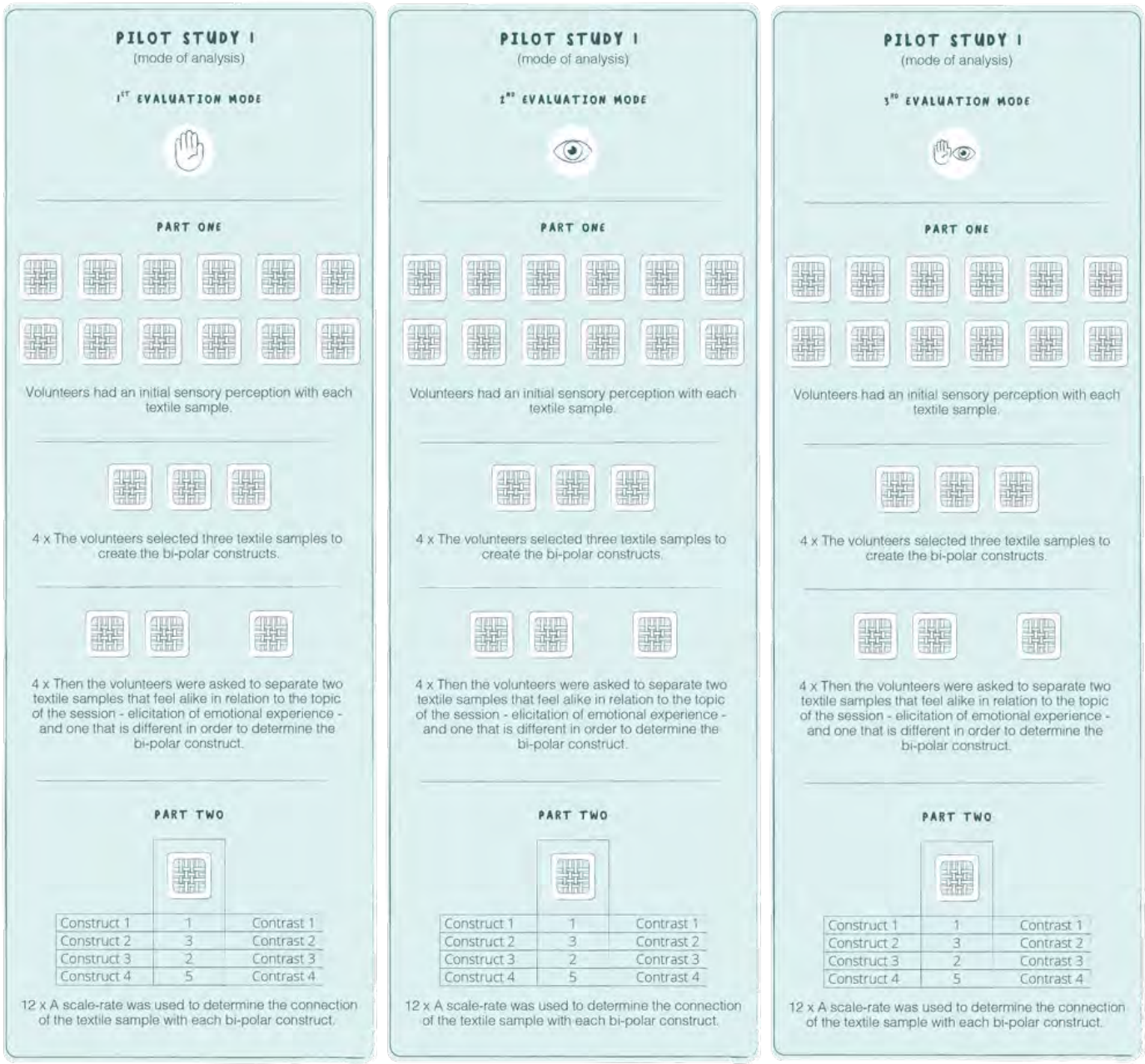


Table 7. 2. First pilot study structure.

One of the volunteers was a Chinese female and the session was conducted in English, where English was her second language; and the other session was in Spanish with a male Mexican

volunteer. The Chinese speaker reported that if the session had been in her mother tongue, she would have felt more comforTable talking about personal experience and emotional factors. The Spanish speaker also reported that having the session in Spanish helped him to fully express and disclose his thoughts. These comments from the volunteers of the pilot study raised an important consideration for the main research. To conduct the practice investigation, participants needed to be native English speakers, or their English level needed to be of a high proficiency in order to verbally express their thoughts without difficulties.

Both sessions contained 12 textiles samples, with both volunteers reporting that having more than 12 textile samples would have been overwhelming for them. Following their advice, it was decided that the general investigation would present a maximum of 12 textiles samples out of the 48 textiles that had been made in order to produce better qualitative data. Section 4.2.1.1.1. presents the evaluation and selection of the 12 textile samples. By reducing the amount of textile samples to assess, participants getting overwhelmed by the high number of textiles to analyse could be avoided, and they could therefore focus better on the analysis of a small number of textile samples. At the same time, 12 textile samples would be sufficient to generate multiple options of analysis and create a good number of bi-polar constructs.

Another point of consideration was the evaluation mode of the textile samples. Following the research of Bang (2010) and Muddy et. al (2001), the way in which a textile is presented and evaluated influences the perception of the individual and therefore affects the results. In the pilot study, the textiles were presented in a white frame as shown in Figure 2, however the frame prevented the volunteers to freely touch the textile and therefore they were only able to analyse the textile using their fingertips (Figures 7.1). The volunteers provided feedback that the white frame created restrictions to evaluate the textile when using the tactile sense

and therefore it was harder for them to associate with emotional experience. It was for this reason that in the main research, participants had a free movement of the textile and the white frame was eliminated.

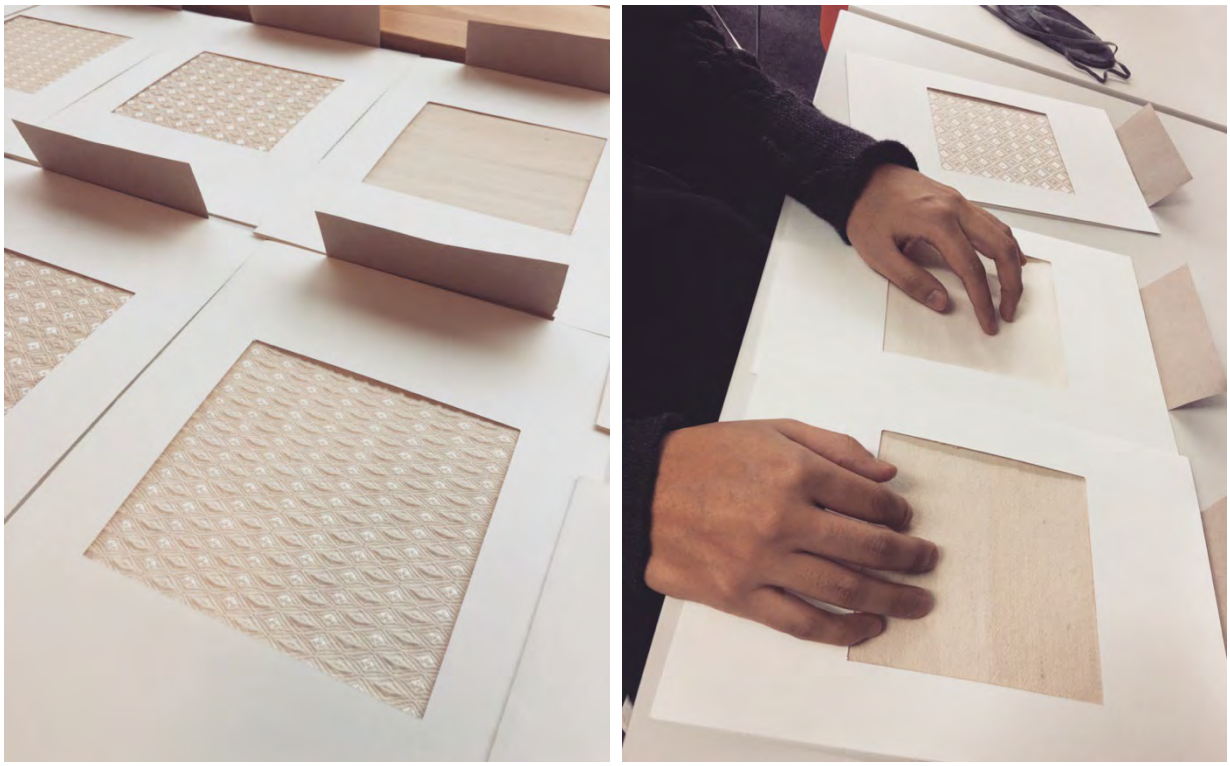


Figure 7. 1. Textile samples in the first pilot study.

Another point to consider was the time scale of each session. It took two and a half hours for the first volunteer to finish the session and three and a half hours for the second volunteer. The first volunteer did not report tiredness or difficulties in concentration during the session; however, the second volunteer commented on his fatigue regarding the long session and suggested to have a shorter session or split the session in three. The time scale of the session was of much importance as if the participants became tired during the session, the data and results could affect the overall research. It was for this reason that it was decided that the first

stage of the practice, about how sensory perception of woven textiles could elicit Emotional experience, would be divided into three sessions instead of one.

From the first pilot study, there were both minor and major changes to the method of analysis and therefore a new pilot study implementing the new changes needed to be carried out (Table 7.3).

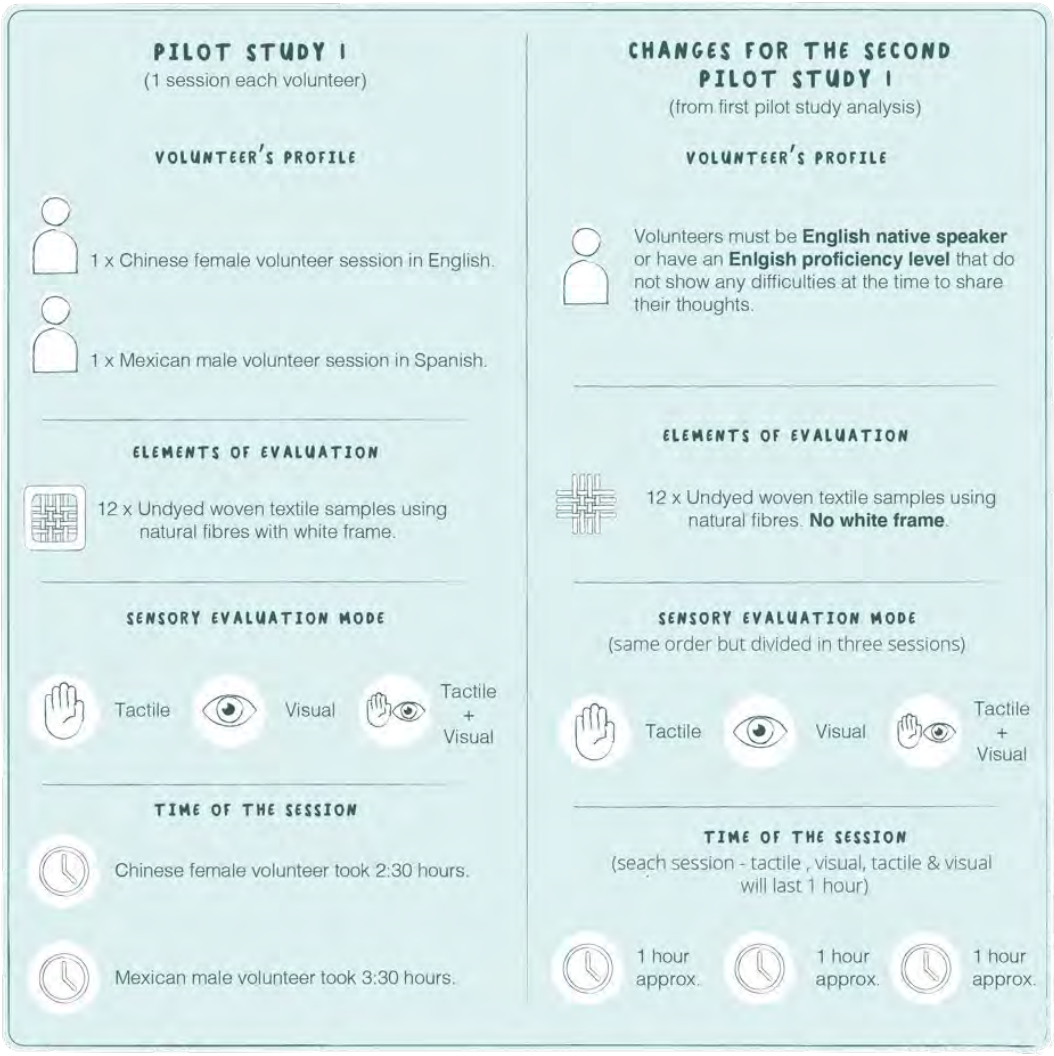


Table 7. 3. Adaptation of the RGT after the first pilot study.

7.2.2. PILOT STUDY TWO

In February 2019 a second pilot study was conducted. The scale of this study was bigger than the first one in order to have a better understanding of the details required at each stage of the research practice. This pilot study involved three female volunteers who were either native English speakers or had sufficient proficiency and therefore could verbally communicate their thoughts without difficulty. During the second pilot study the volunteers were invited to Stage one, Stage two and the first part of Stage three of the planned practice investigation (Figure 7.2).

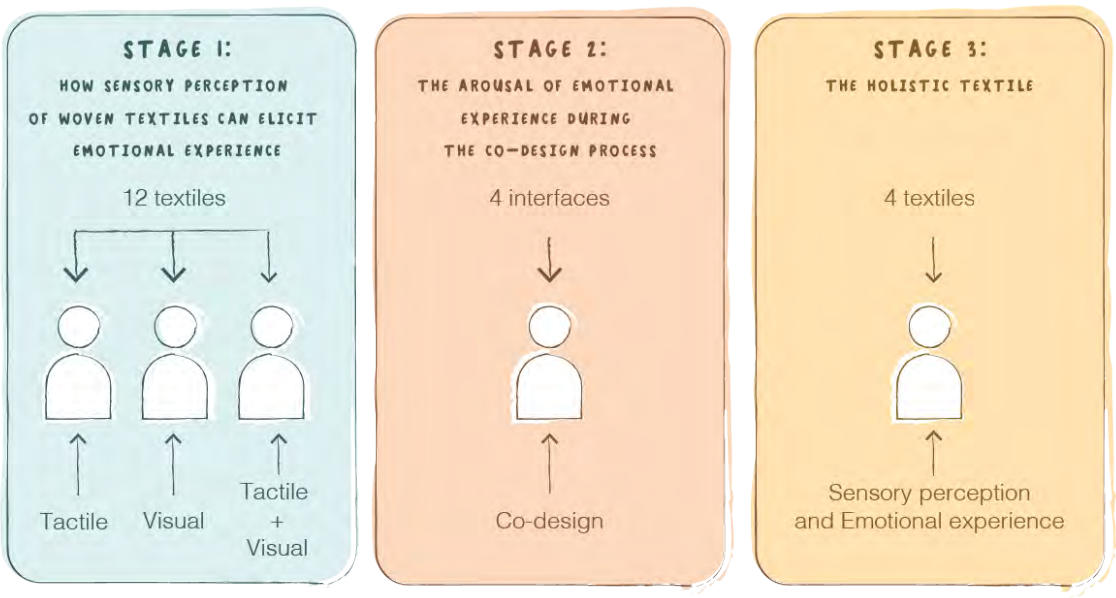


Figure 7. 2. Second pilot study structure.

7.2.2.1. STAGE ONE

As a result of the analysis of the initial pilot study, it was decided that stage one would be divided into three RGT interviews of one-hour each:

- RGT interview one corresponded to the tactile unimodal analysis of the 12 woven textile samples. The volunteer was requested to use hand sanitizer to protect the textile samples (Overvliet et al., 2016) and was blindfolded in order to prevent any visual contact with the textile samples.
- RGT interview two corresponded to the visual unimodal analysis of the 12 woven textile samples. The volunteer was asked to refrain from any tactile encounter during the evaluation mode.
- RGT interview three corresponded to the tactile-visual bimodal analysis of the twelve woven textile samples. The volunteer could use both senses, tactile and vision, to evaluate the textile samples.

The textile samples were presented without a white frame to eliminate any restrictions at the time to evaluate the textile, also there were no limitations of time or how to handle the textile sample (Figure 7.3). On the contrary to Overvliet et al.'s (2016) research, the tactile evaluation of the textiles was not restrictive, and instead they could touch with their hands in different ways in order to simulate the natural manner in which people generally handle textiles.

Figure 7. 3. Volunteer during interview one of Stage one analysing the textiles, based on tactile unimodal analysis.

Another change for this pilot study was the beginning part of the session. During the first pilot study, the volunteers could first touch each textile and then decide which three they wanted to put together to create the bi-polar construct. In this second pilot study, the designer-researcher gave the same three textile samples to each volunteer. This change was implemented for two reasons; first, it reduced the duration of the session and therefore was not as time-consuming for the volunteer, who as a result could focus better during the session. Second, all volunteers had the same combination of textiles to elicit the RGT bi-polar construct, which would produce more trustworthy results for the research at the time to analyse and create connections between volunteers.

The volunteers of the second pilot study reported that the duration of the three RGT interviews were good to keep concentrated on the sensory perception evaluation. The RGT interviews were designed to take place one week apart, however, the drawback to this was that sometimes due to volunteer's schedule the RGT interviews were cancelled, which delayed the completion of the process. Another important point was that having three different sessions one-week apart from each other influenced the way in which the textiles were perceived. During the first pilot study, the volunteers connected the textiles from the tactile evaluation to the visual evaluation easily, similar to Bang's (2007) study. On the contrary, when the evaluations were one-week apart, volunteers did not associate previous responses during the analysis and therefore providing a more independent analysis.

7.2.2.2. STAGE TWO

The RGT method was adapted for the needs of Stage two. During Stage one, volunteers created their RGT bi-polar constructs in each of the three sessions, however due to this section looking at co-design factors based on Thallmaier's (2015), the RGT bi-polar constructs were presented to the volunteers. The process of Stage two's session was the following: five days previous to the session the volunteers were requested to select four texts based on different variables: one text they had written (recently or historically) and felt an emotional connection with, one text that they had written and with which they felt no emotional connection, one text they had read (and not written) and felt an emotional connection with, and one text that they had read (and not written) but felt no emotional connection with. These texts could be anything from a poem, the lyrics of a song or a section from a book, to a text message or letter.

The only restriction was that the texts could not exceed 250 characters and had to be in the English language.

Once the session started the volunteers interacted with the four computer-based interfaces in order to co-design a woven textile for each interface that elicited Emotional Experience to the volunteer. Then, the RGT elements of this session were the four computer-based interfaces. The RGT bi-polar constructs tackled the *cognitive effort, authorship, decision making, representation of oneself, navigation* and *emotionally attachment* factors.

Stage two consisted of one session to analyse the arousal of Emotional Experience during the co-design process. Like Woven Memories (Nadal, 2016) and Abstract_ (Eriksen, 2014), which used a web-based interface to co-design textiles with Emotional Experience by introducing a text input, this research used a web-based interface with text input to co-design with the participants. The designer-researcher created four computer-based interfaces to co-design one woven textile that elicited Emotional Experience from the volunteer. All four computer-based interfaces had similar inputs but with five attributes; Table 7.4 shows the different attributes of each computer-based interface.

Table 7. 4. Factors to be analysed on each computer-based interface.

7.2.2.2.1. INPUT & TEXT

To start interacting with the four computer-based interfaces, the volunteers had to insert a text that would be translated using digital coding. The text had two variables: whether the text had an emotional connection for them or not, and whether it was written by them or not. The first variable was designed to find out to if the emotional importance of the text to the participant impacted the final textile design, or if it did not have any effect on it at all. The second variable aimed to understand the preferences of the participants of this research, and

whether they felt comforTable sharing their own words or preferred to be represented by a text written by someone else.

7.2.2.2.2. CODE

When the volunteers inserted the text into the computer-based interfaces they could instantly see the pattern created next to the text. The pattern was made using two different codes. Two interfaces used ASCII code (American Standard Code for Information Interchange) to translate the text. ASCII code is 'intended for the interchange of information among information processing systems, communication systems and associated equipment' (American Standard Code for Information Interchange, 1963: 7). When it was created, it was intended to have a 7-bit set due to it being the right number of characters and actions needed for the computer at that time. Eventually as 8-bit – 64-bit computers began to replace 12-bit – 36-bit computers, it became more common to use an 8-bit set. For instance, a capitalised 'A' using the ASCII code is 01000001, while a small 'a' is 01100001. Then the '0' and '1' are translated into a grid of white and black squares, where the '0' are white squares and the '1' black squares (Figure 7.4).

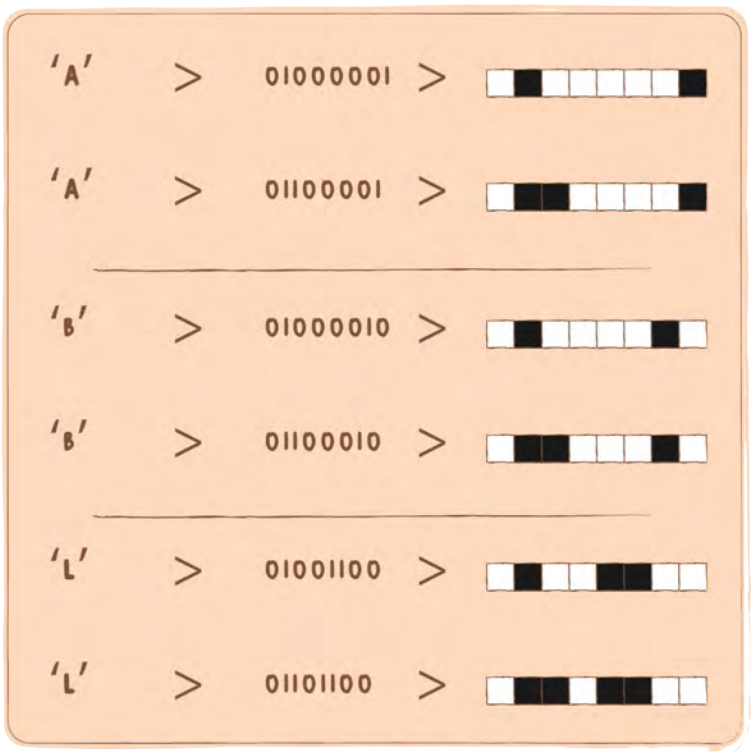


Figure 7. 4. Representation of the translation of ASCII code to a graphic pattern.

On the contrary the code for the other two interfaces was random code. Random refers to 'the process of making something random. It reduced bias as much as possible. Randomisation was designed to 'control' (reduce or eliminate if possible) bias. A random process is a sequence of random variables describing a process whose outcomes do not follow a deterministic pattern, but follow an evolution described by probability distributions' (Stephens, 2018: xxiii). This variation between codes was implemented in order to understand whether the volunteers would prefer the aesthetics of a random pattern, which could be changed multiple times until they were satisfied, or if they preferred the exact translation of the text chosen by a specific code.

7.2.2.2.3. ATTRIBUTES

The attributes' variable refers to the possibilities that the interface offered the volunteers in order to modify and personalise the pattern. As the volunteers were not experts in weaving, their knowledge of yarns and weave structures was based on the sensory perception during stage one. The three volunteers fed back that the presence of a physical textile that represented their choice could help to picture better the qualities of the final co-design option, and therefore made the process easier. At this point the research introduced three new variables: 1) the active role of the designer during the co-design process, 2) a sample of the yarns and weave structures and 3) information about the text, code, yarn and weave structure sections.

7.2.2.2.4. ORGANISATION

Based on the research of Thallmaier (2015), the way in which steps are presented influences the understanding of the computer-based interface and therefore the experience of co-designing. It presented holistic and analytic by-attribute interfaces. If the information is too complicated to be understood or too dense, volunteers could have become confused and instead of it being an enjoyable experience it could have become a stressful experience.

In light of the above research by Herd (2012), from the second pilot study three variables were introduced to Stage two, adding *textile guide* variable and *Designer's active role* (Table 7.5).

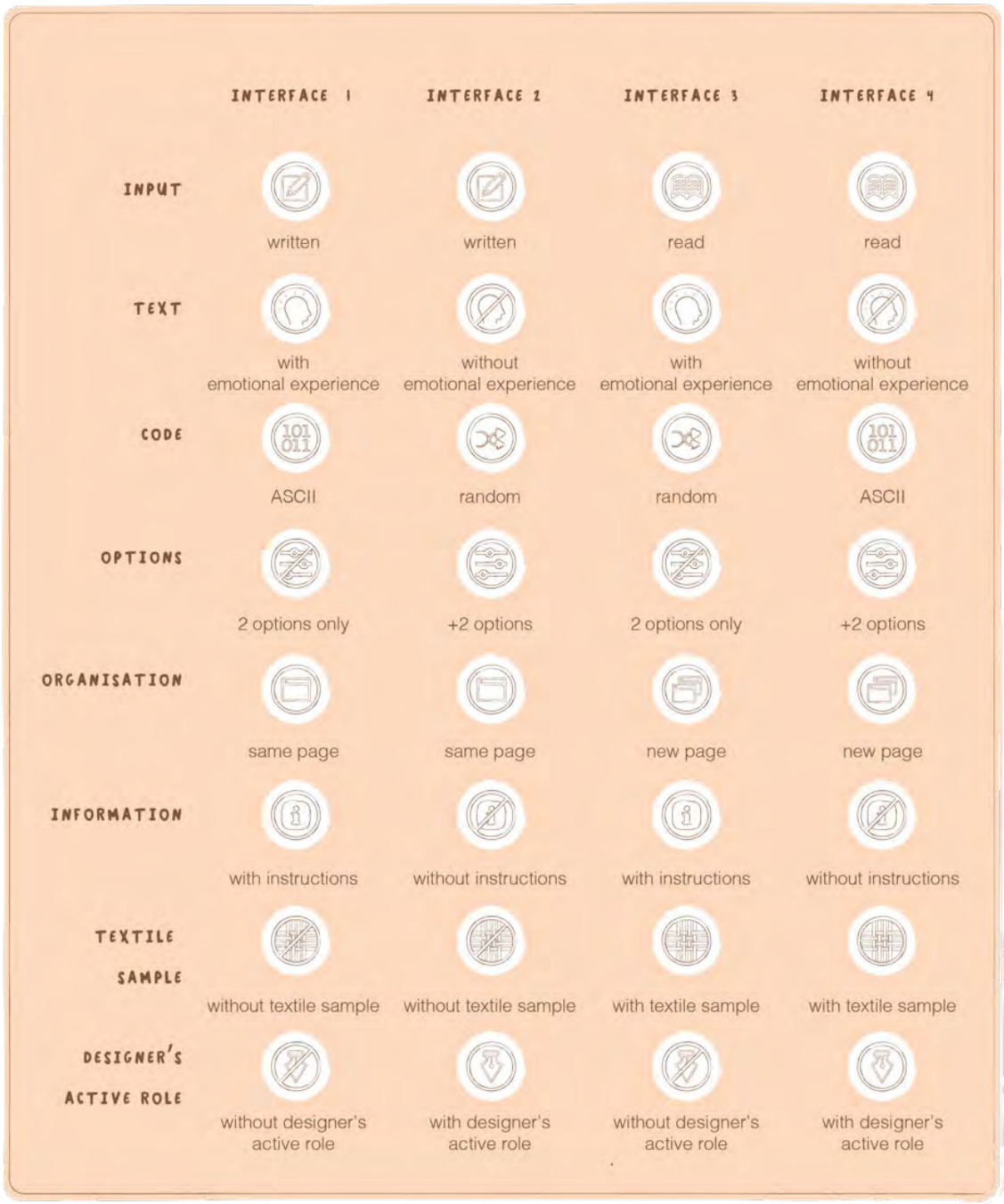


Table 7. 5. Factors to be analysed on each computer-based interface after second pilot study.

7.2.2.3. STAGE THREE

Stage three was divided into two sessions to analyse the computer-led co-design experience. Computer-led co-design experience referred not only to the sensory perception of the textile but also the co-design involvement that the volunteer invested in the design process. In the first interview of this stage volunteers analysed four textiles made for them based on the previous interviews from Stage one and Stage two. The second interview presented a final co-designed textile that summarised the full process and was a result of all previous interviews. During the second pilot study, the second session of Stage three – materialisation of the final co-designed textile – was not conducted due to economical and time limitations of the research.

After the Stage two session, the volunteers created four co-designed textile patterns based on the texts they selected and provided their choices of yarns and weave structures. Then the designer-researcher - through the information gathered during the sessions from Stage one and Stage two and their tacit knowledge - created four co-designed textile samples for each volunteer. The process to weave the four textiles was the following:

1. The designer-researcher analysed and compared the selection of yarns and weave structures for each volunteer to stage one data.
2. The designer-researcher created connections between the yarns and weave structures selected and the evidence from Stage one. If the evidence from Stage one reaffirmed the selection of the volunteer's then the textile was woven following the volunteer's choice. If the yarn and weave structures did not reaffirm then a further analysis was

conducted as to whether the interface created limitations for the volunteer and therefore their choice did not match the evidence from Stage one.

3. Then, the designer-researcher prepared the files to weave the textiles using the TC-1 loom. After some testing and modifications of the weave structures to produce the co-designed textile samples, the textiles were woven (Figure 7.5).

Figure 7. 5. Co-designed textile samples.

In the first interview of Stage three, the volunteers were invited to evaluate the four co-designed woven textiles using first tactile unimodal analysis, second visual unimodal analysis, and third tactile-visual bimodal analysis. The interview did not have to be split into three interviews due to the small number of textiles being analysed and only scale-rating the co-designed textile samples to the RGT bi-polar constructs of Stage one and Stage two.

The volunteers did not create the RGT bi-polar constructs as they were analysing the ones that they created during Stage one and some of the RGT bi-polar constructs presented during Stage two. For the requirements of this research, the Repertory Grid Technique was adapted for this interview. The aim of this interview was to analyse the four co-designed woven textiles and whether they elicited Emotional Experience in the volunteers based on the evidence from Stage one and Stage two. The participants used a scale-rating from 1 to 5 to associate the RGT bi-polar constructs with the co-designed woven textiles (Figure 7.6).

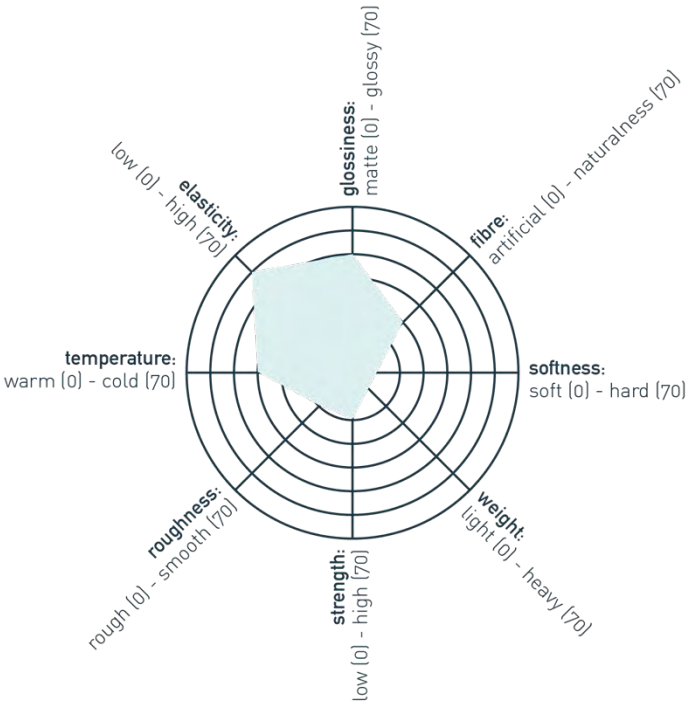
Figure 7. 6. Tactile unimodal analysis of co-designed textile sample.

7.2.2.4. OVERALL REVIEW OF THE SECOND PILOT STUDY

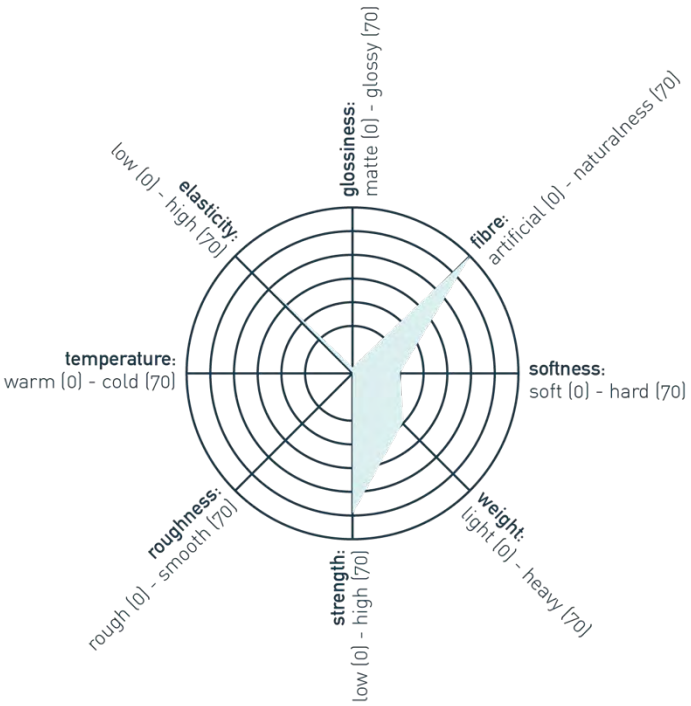
From the second pilot study, the Repertory Grid Technique method was modified and adapted in each Stage to fulfil the aims and objectives of this research. Stage one confirmed the changes made from the first pilot study and helped with the volunteer's fatigue. After the feedback from the volunteers during Stage two, three new variables were added. Finally, the first interview of Stage three confirmed that the time scale was of a suiTable length, however the researcher needed to add a reminder of their choices during the session for the volunteers.

7.3. APPENDIX C: TEXTILE RADAR CHART

This Appendix provides the radar chart evaluation of the 48 textile samples together with an image of the textile.

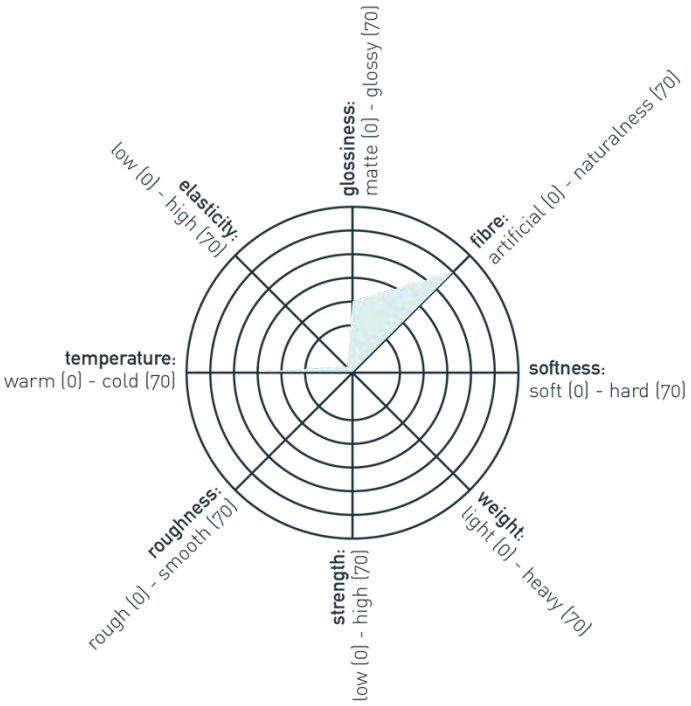


textile sample 01
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** plain | **draft:** double straight |

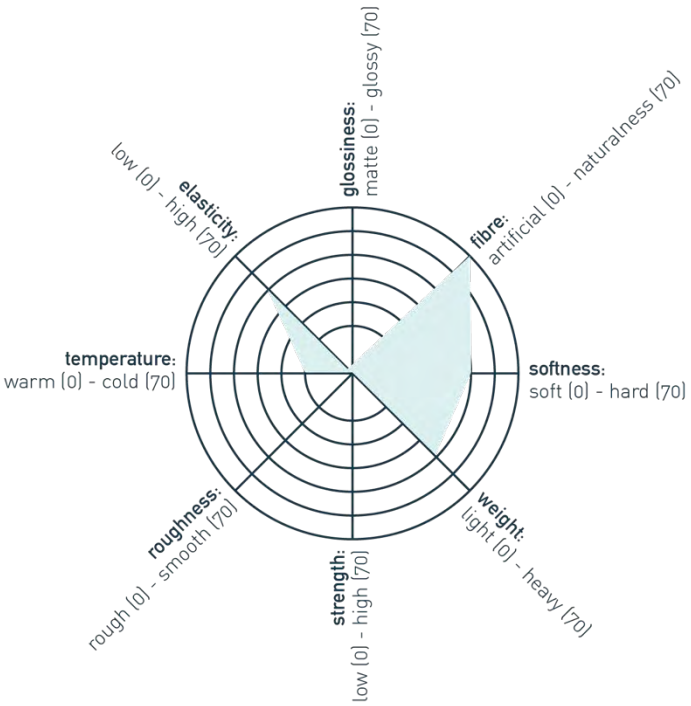


textile sample 02
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** twill | **draft:** double straight |

Figure 7. 7. Radar chart textile samples 01 and 02.



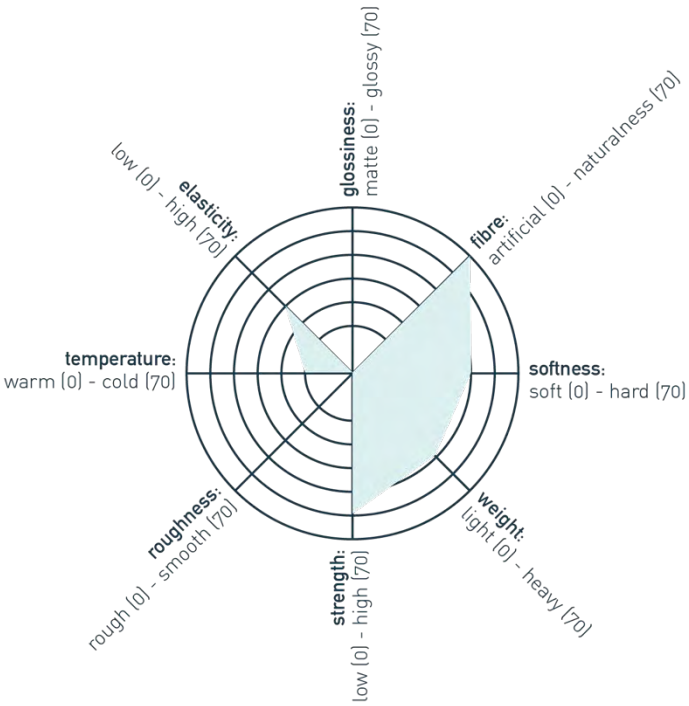
textile sample 03
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** herringbone | **draft:** double straight |



textile sample 04
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** sateen | **draft:** double straight |

Figure 7. 8. Radar chart textile samples 03 and 04.

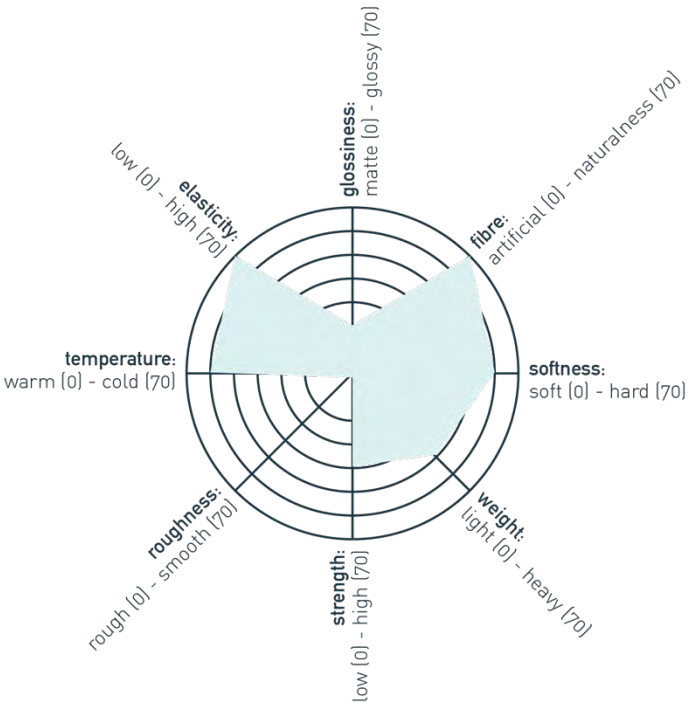
textile sample 05
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** half basket | **draft:** double pointed |



textile sample 06
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** twill | **draft:** double pointed |

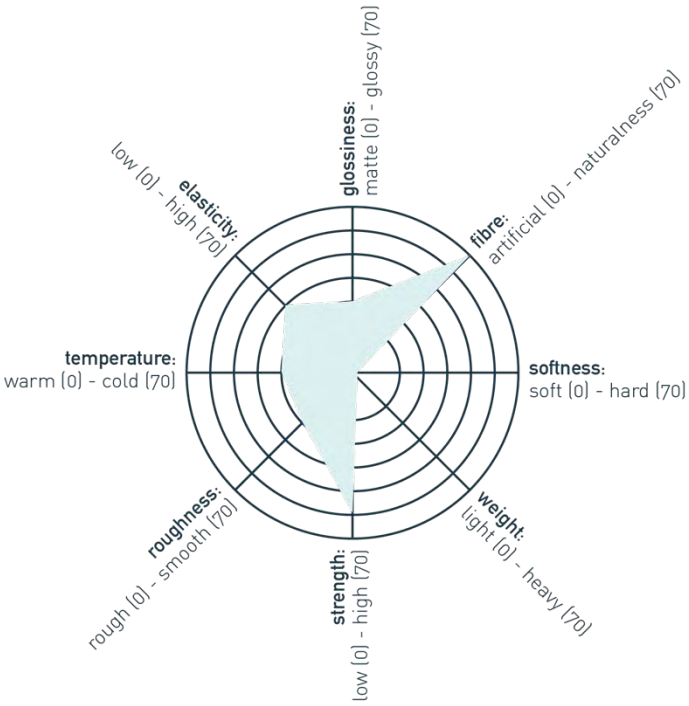
Figure 7. 9. Radar chart textile samples 05 and 06.

textile sample 07
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** herringbone | **draft:** double pointed |

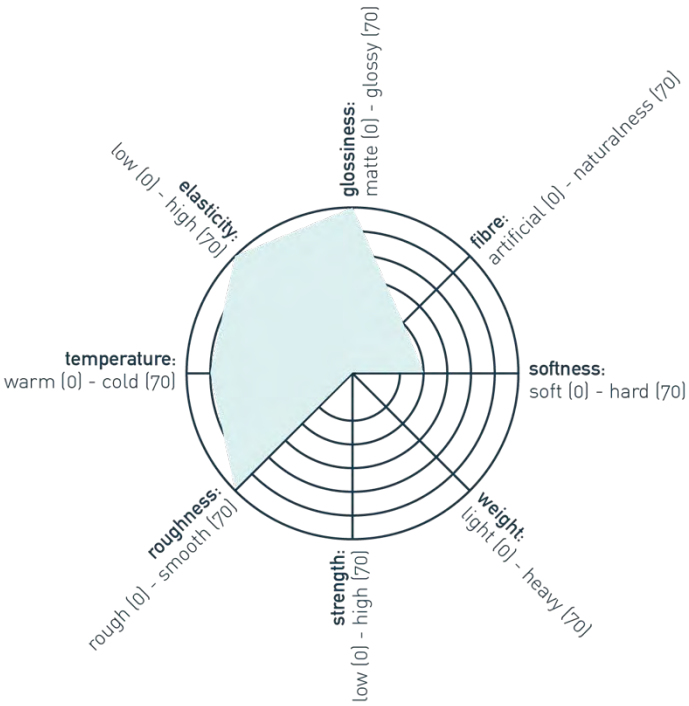


textile sample 08
| **warp:** 2/120s nm spun silk | **weft:** 2/24 nm alpaca wool |
| **structure:** diamond | **draft:** double pointed |

Figure 7. 10. Radar chart textile samples 07 and 08.

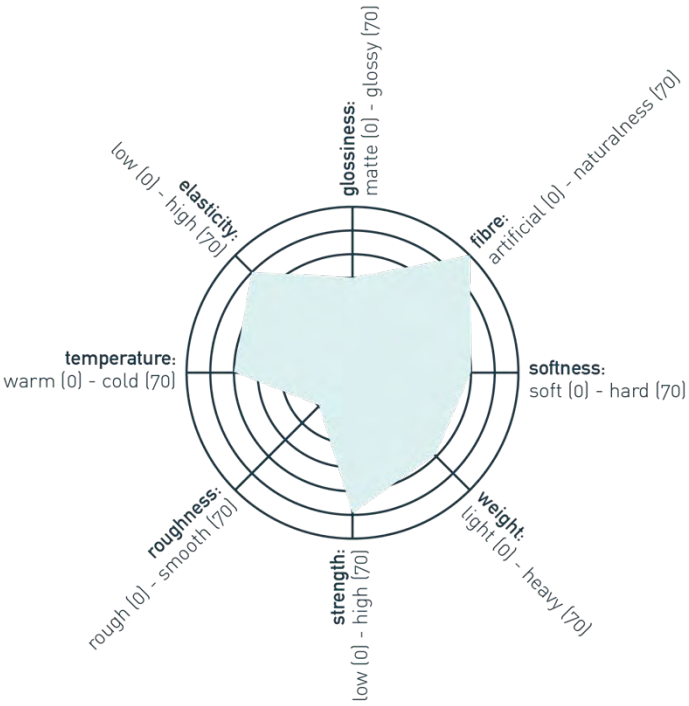


textile sample 09
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** plain | **draft:** double straight |

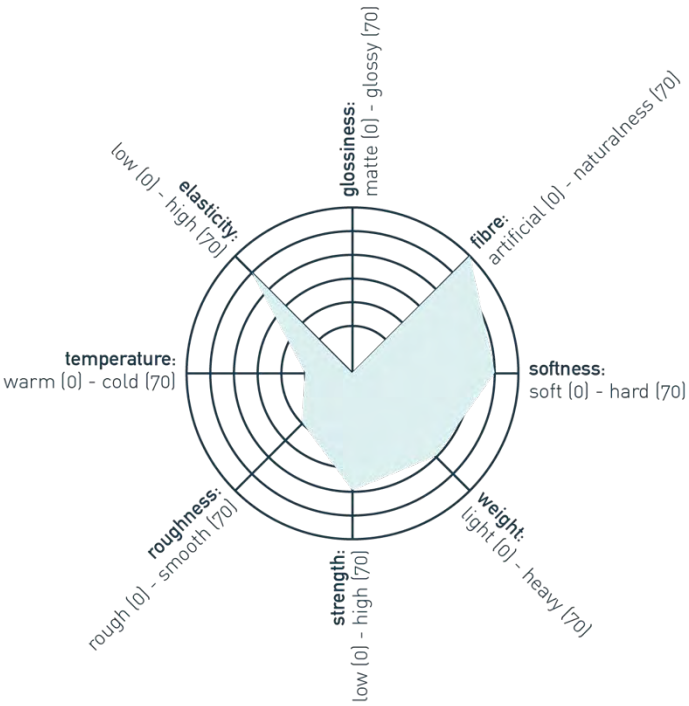


textile sample 10
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** twill | **draft:** double straight |

Figure 7. 11. Radar chart textile samples 09 and 10.

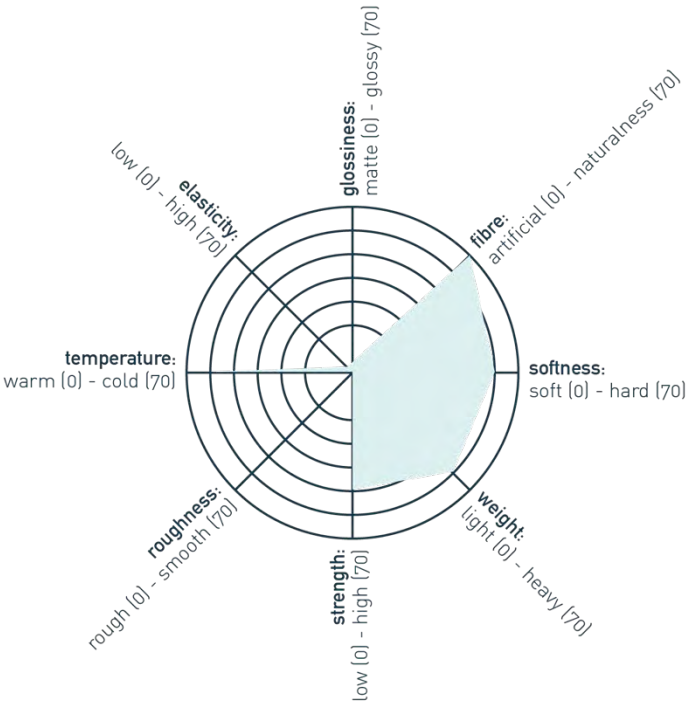


textile sample 11
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** herringbone | **draft:** double straight |

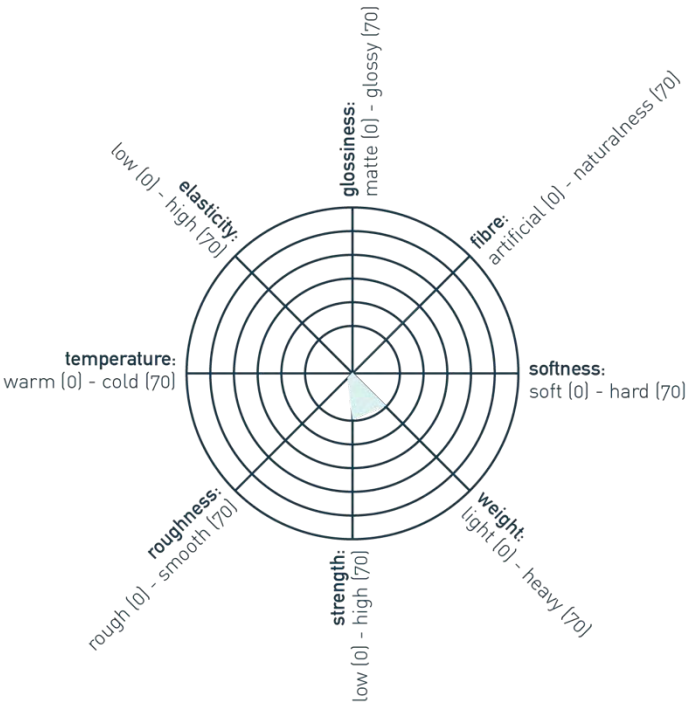


textile sample 12
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** sateen | **draft:** double straight |

Figure 7. 12. Radar chart textile samples 11 and 12.

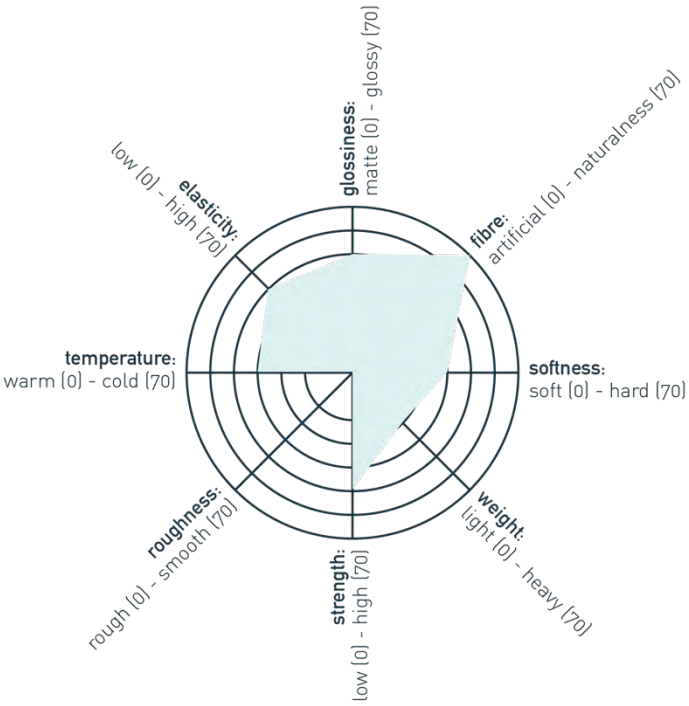


textile sample 13
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** half basket | **draft:** double pointed |

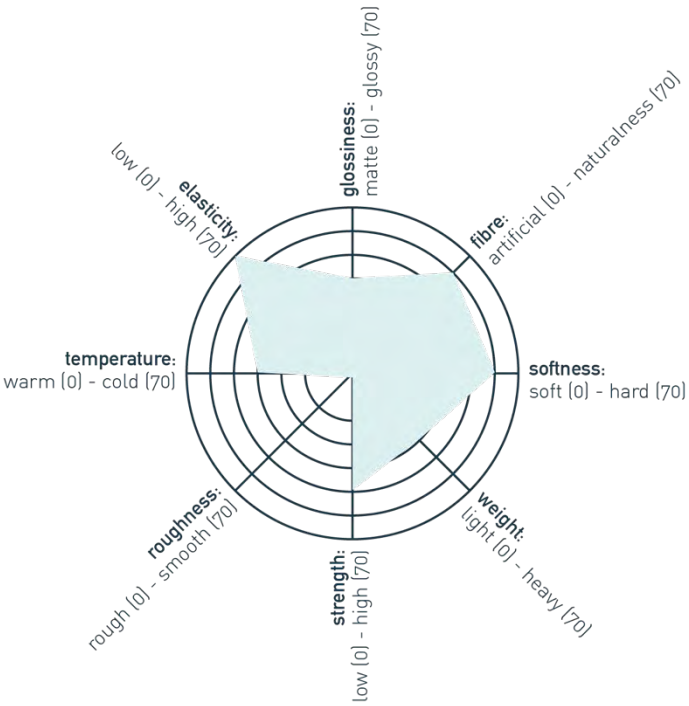


textile sample 14
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** twill | **draft:** double pointed |

Figure 7. 13. Radar chart textile samples 13 and 14.

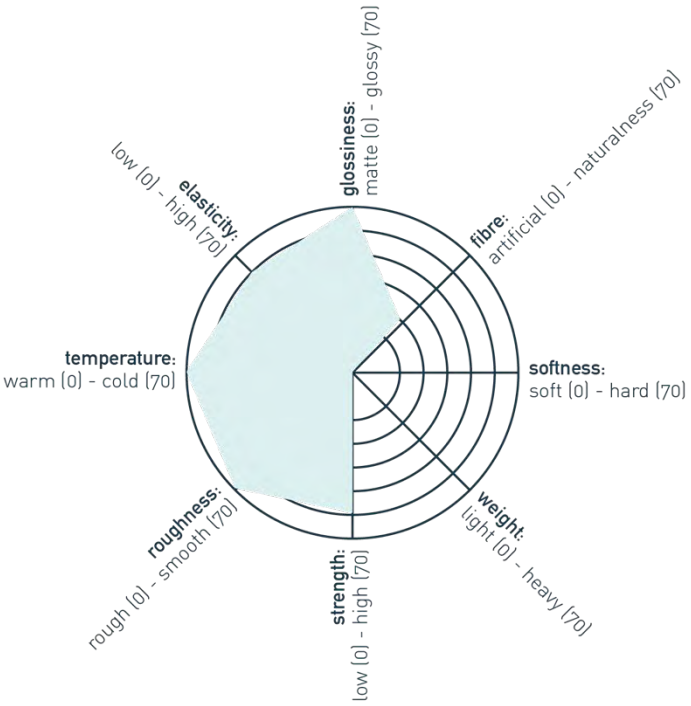


textile sample 15
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** herringbone | **draft:** double pointed |

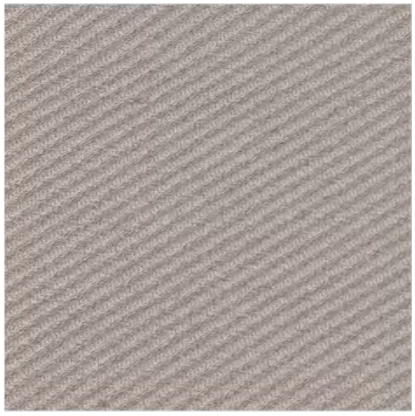


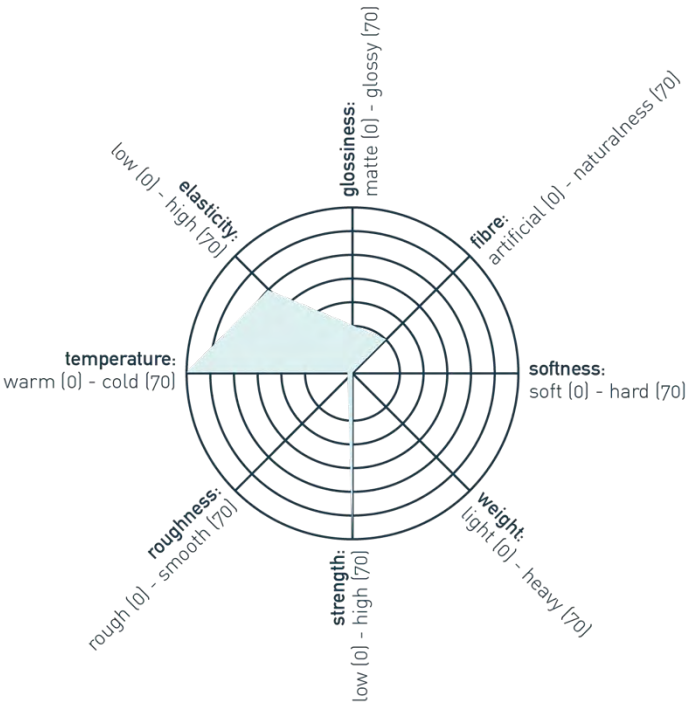
textile sample 16
| **warp:** 2/120s nm spun silk | **weft:** 1/16 nm angora wool |
| **structure:** diamond | **draft:** double pointed |

Figure 7. 14. Radar chart textile samples 15 and 16.



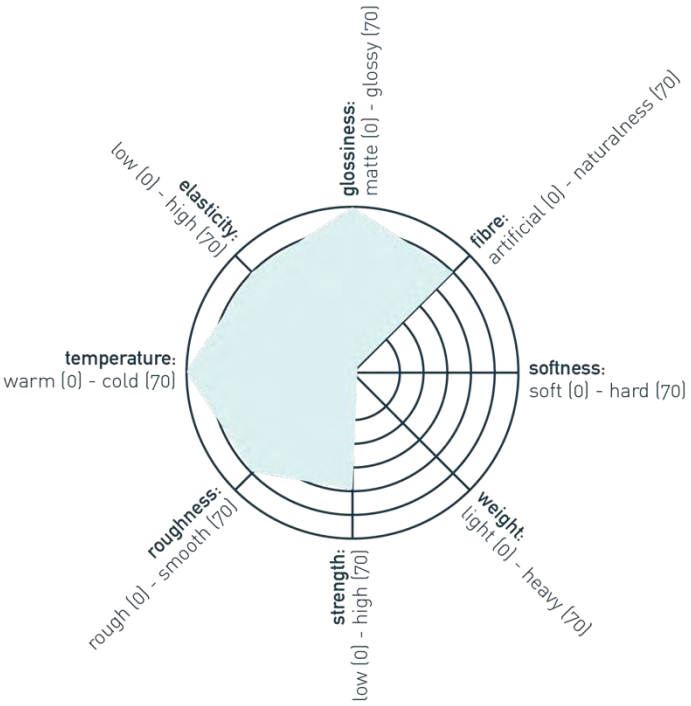
textile sample 17
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** plain | **draft:** double straight |



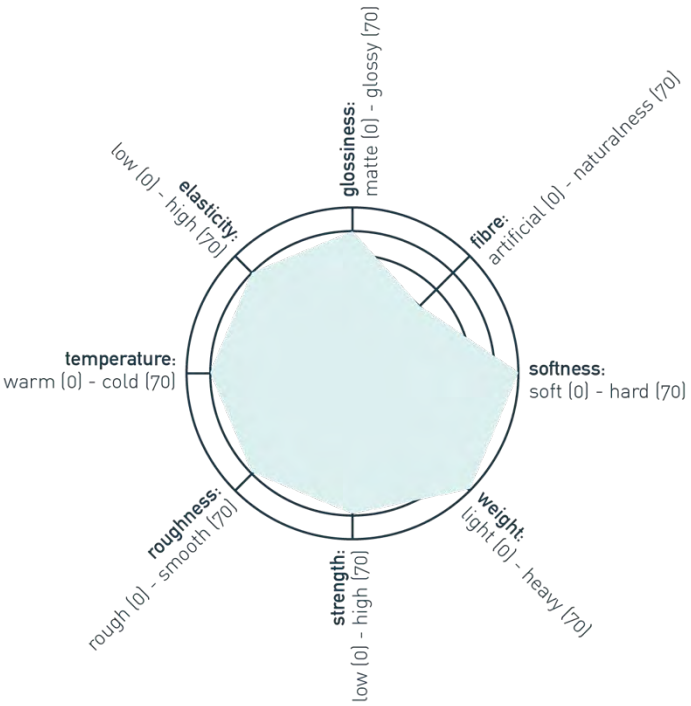


textile sample 18
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** twill | **draft:** double straight |

Figure 7. 15. Radar chart textile samples 17 and 18.



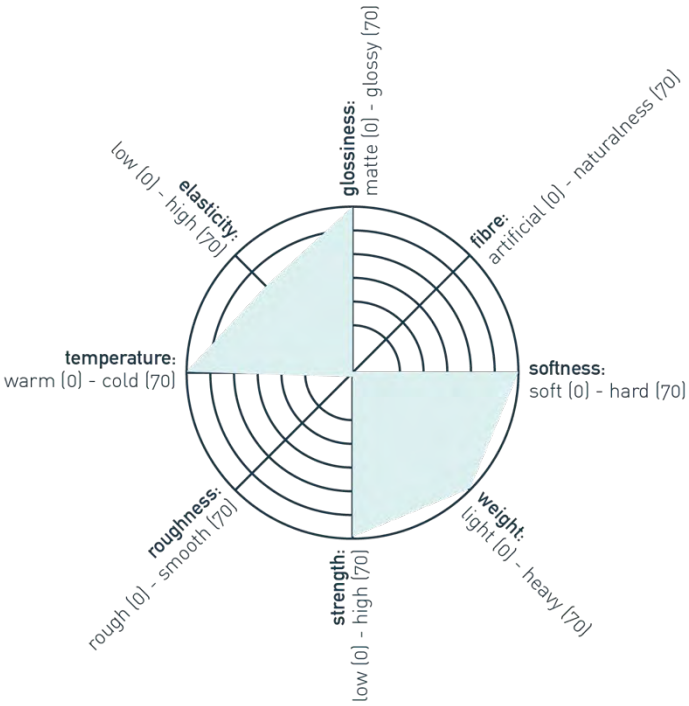
textile sample 19
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** herringbone | **draft:** double straight |



textile sample 20
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** sateen | **draft:** double straight |

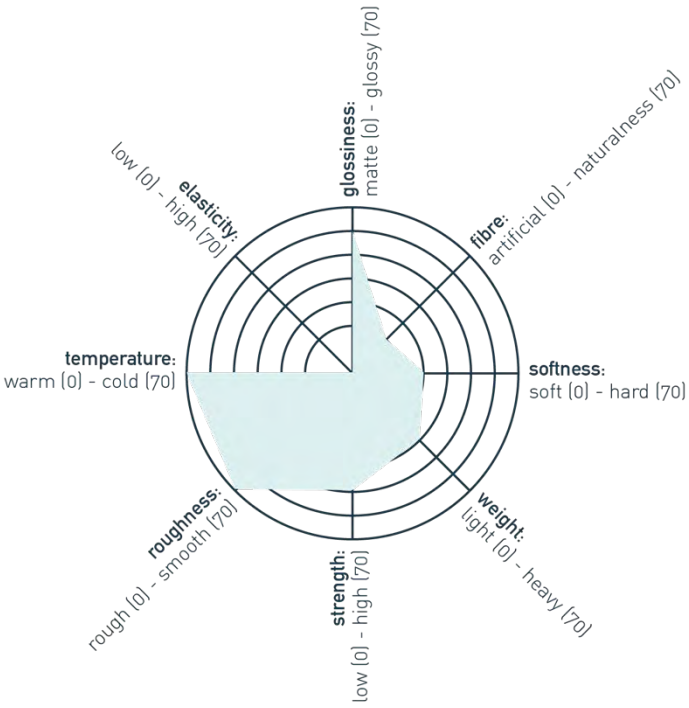
Figure 7. 16. Radar chart textile samples 19 and 20.

textile sample 21
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** half basket | **draft:** double pointed |

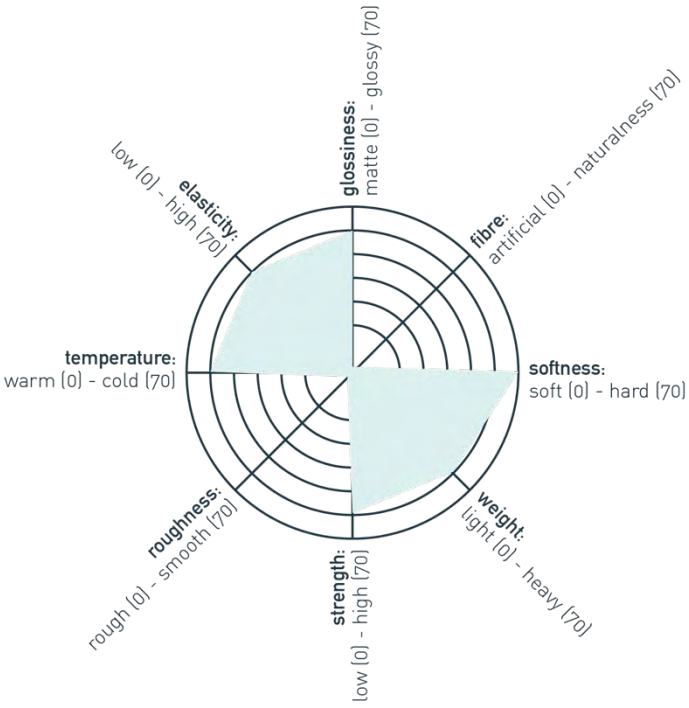


textile sample 22
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** twill | **draft:** double pointed |

Figure 7. 17. Radar chart textile samples 21 and 22.

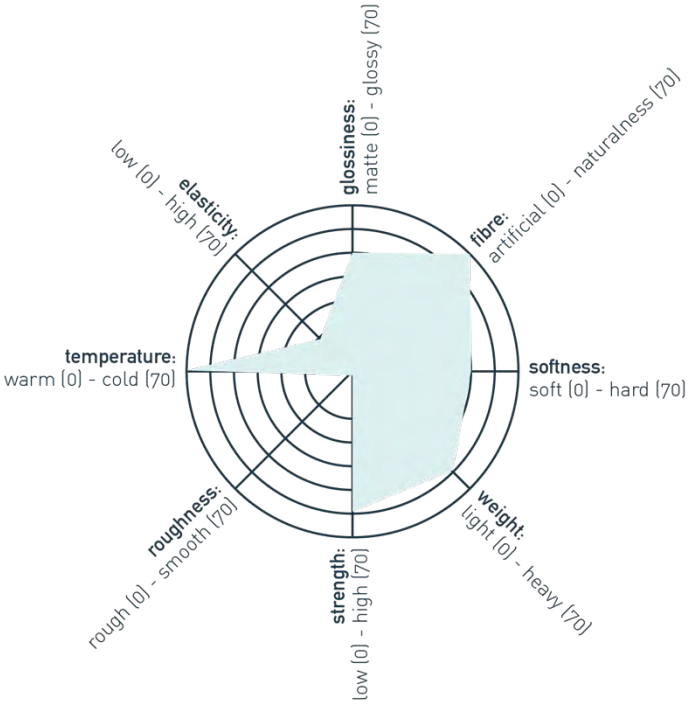


textile sample 23
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** herringbone | **draft:** double pointed |

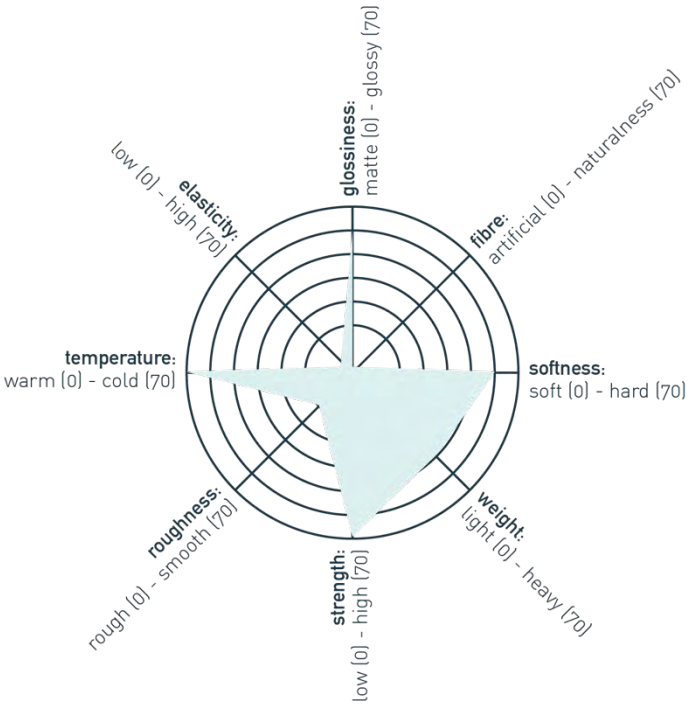


textile sample 24
| **warp:** 2/120s nm spun silk | **weft:** 2/52 nm mercerised cotton |
| **structure:** diamond | **draft:** double pointed |

Figure 7. 18. Radar chart textile samples 23 and 24.

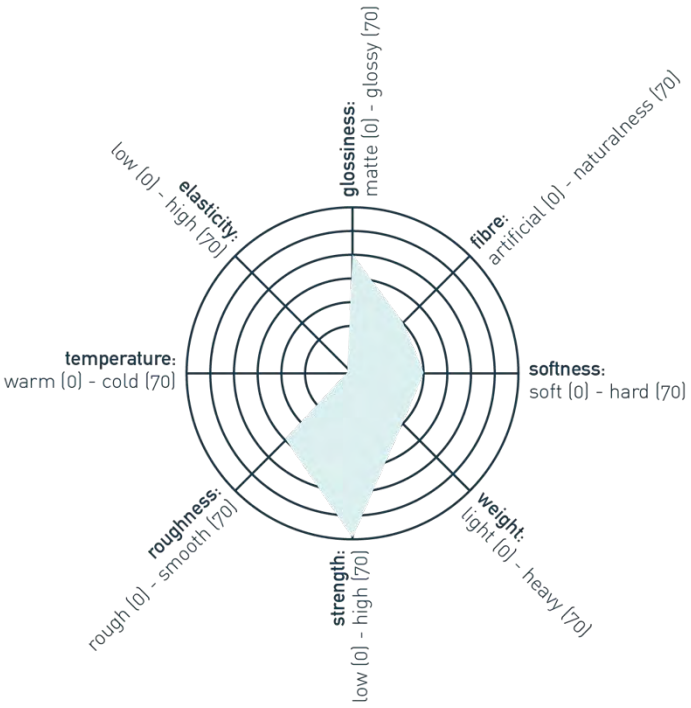


textile sample 25
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** plain | **draft:** double straight |

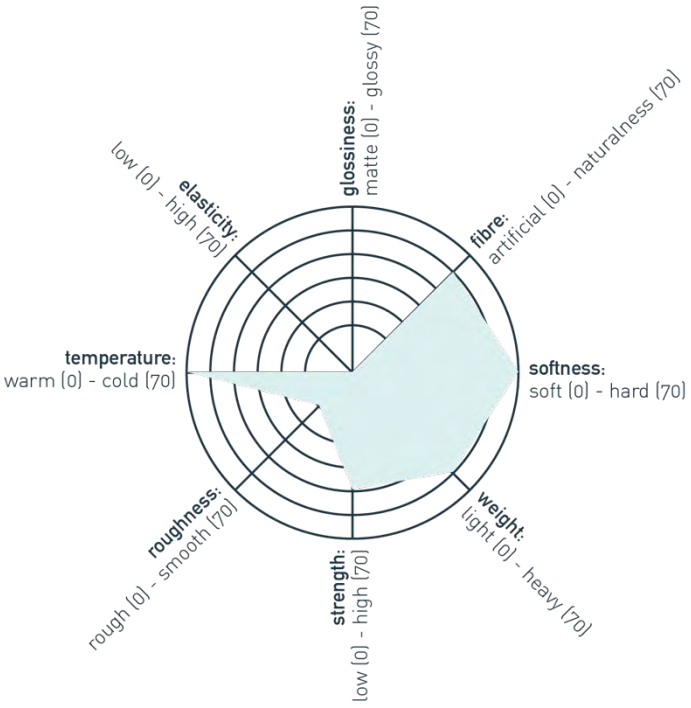


textile sample 26
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** twill | **draft:** double straight |

Figure 7. 19. Radar chart textile samples 25 and 26.



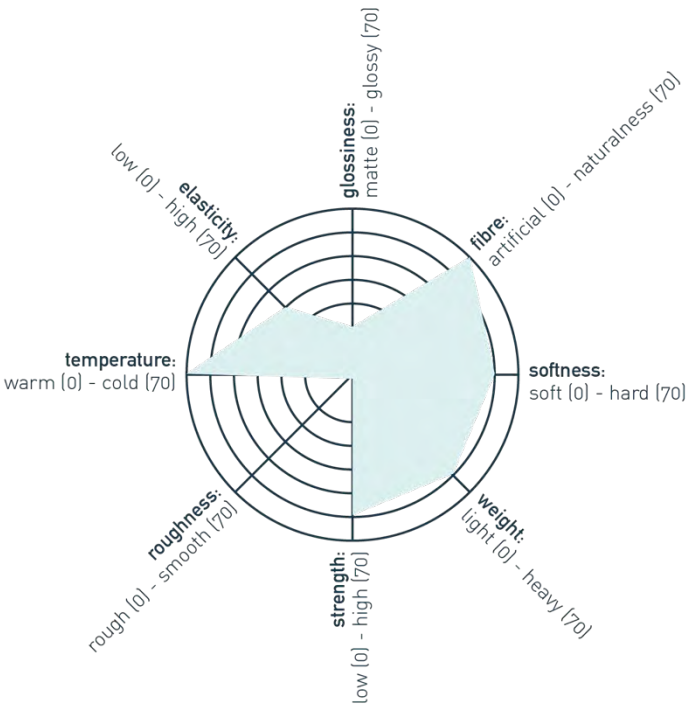
textile sample 27
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** herringbone | **draft:** double straight |



textile sample 28
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** sateen | **draft:** double straight |

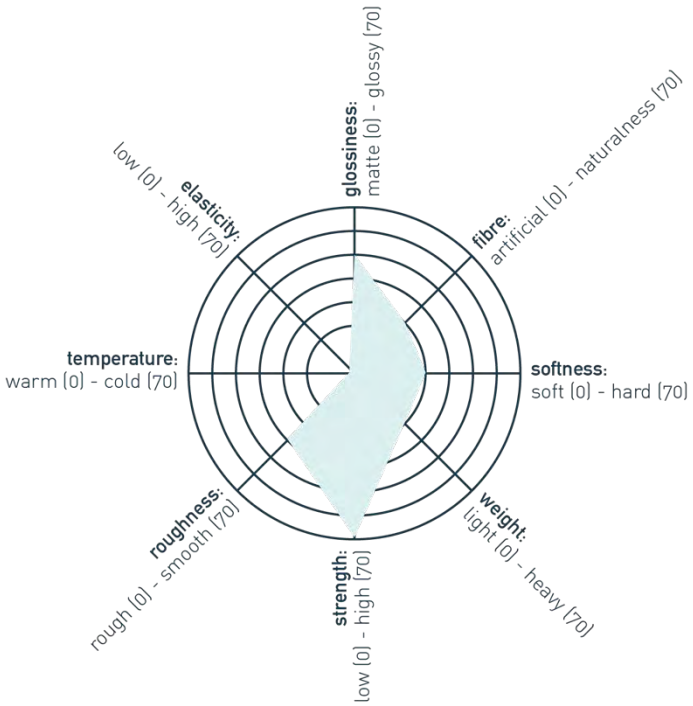
Figure 7. 20. Radar chart textile samples 27 and 28.

textile sample 29
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** half basket | **draft:** double pointed |

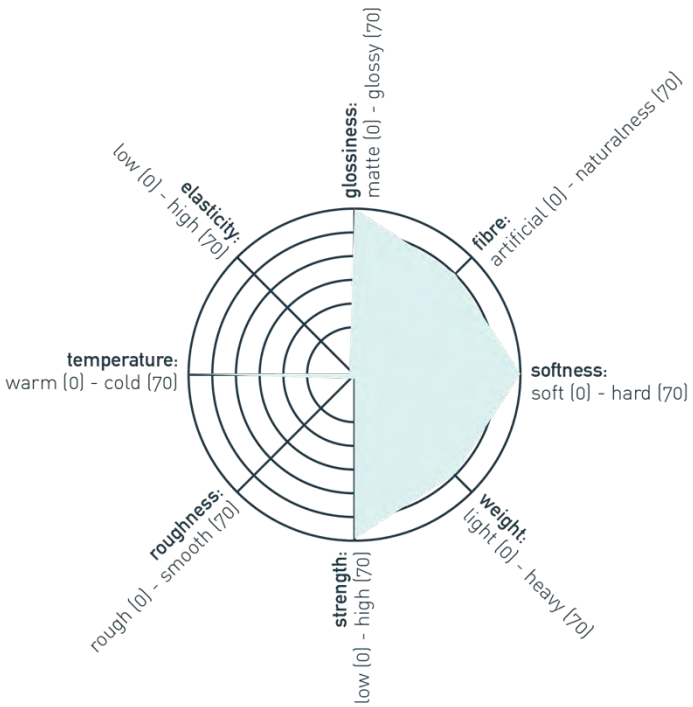


textile sample 30
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** twill | **draft:** double pointed |

Figure 7. 21. Radar chart textile samples 29 and 30.

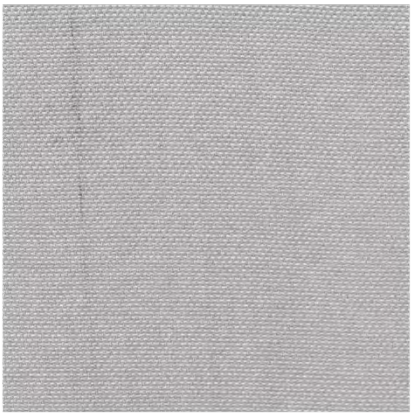


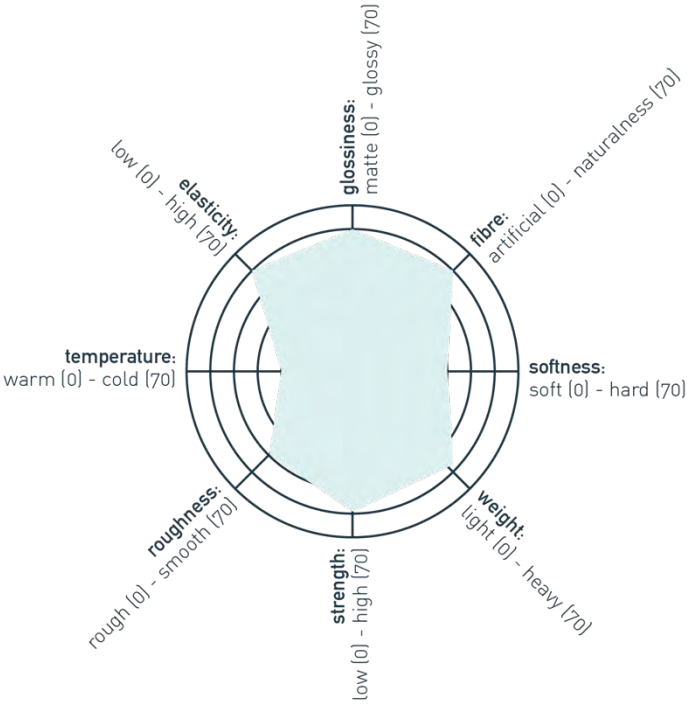
textile sample 31
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** herringbone | **draft:** double pointed |



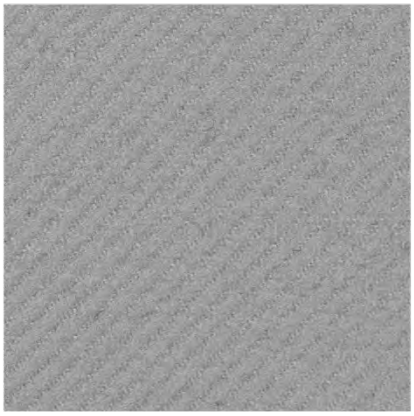
textile sample 32
| **warp:** 2/120s nm spun silk | **weft:** 1/8.4 nm linen |
| **structure:** diamond | **draft:** double pointed |

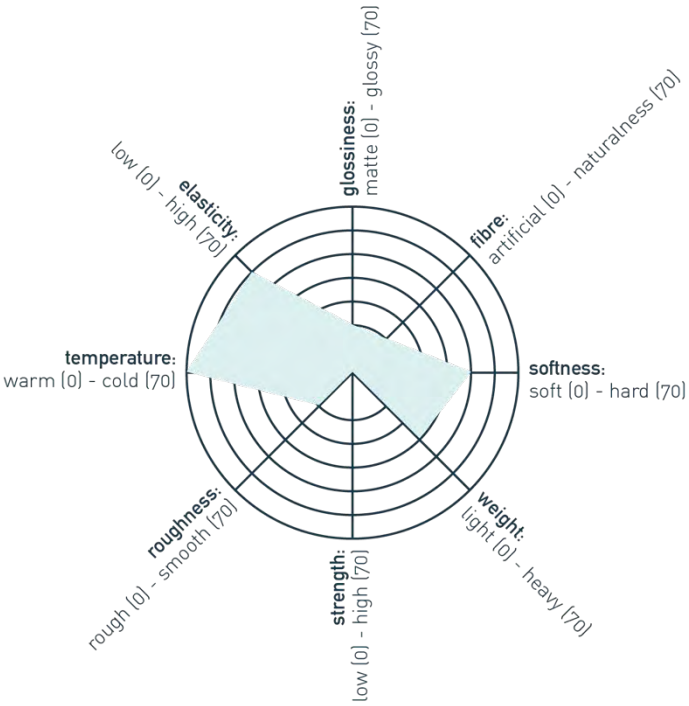
Figure 7. 22. Radar chart textile samples 31 and 32.





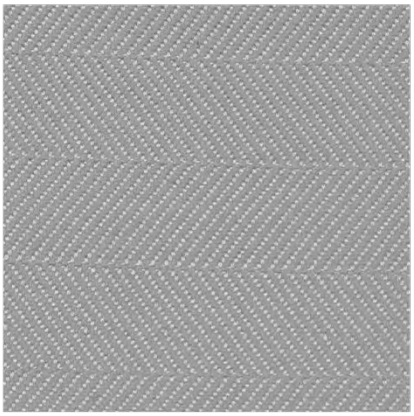
textile sample 33
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:** plain | **draft:** double straight |

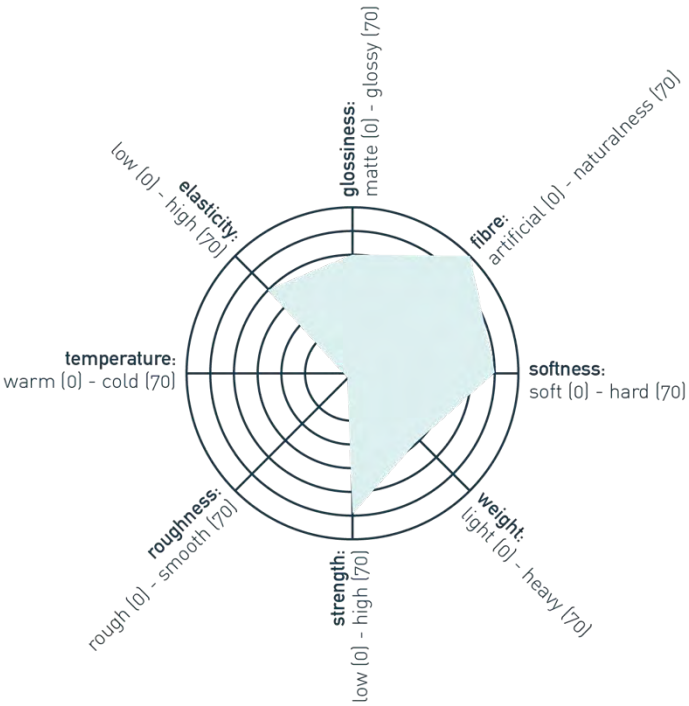




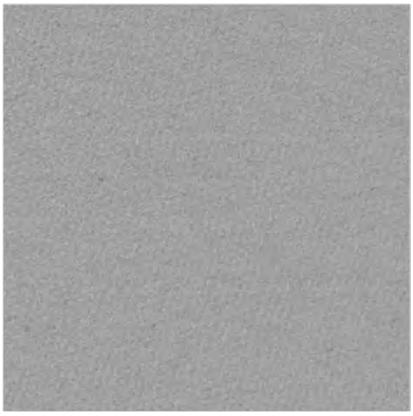
textile sample 34
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:** twill | **draft:** double straight |

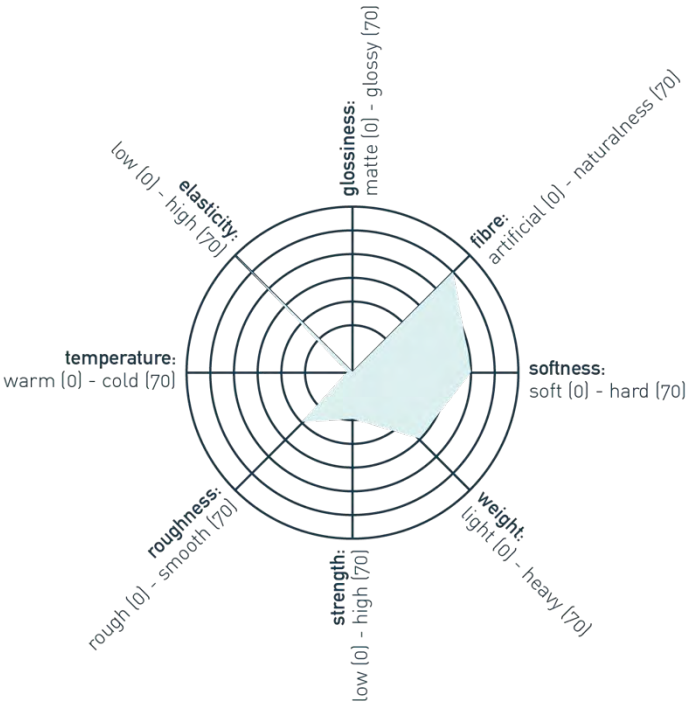
Figure 7. 23. Radar chart textile samples 33 and 34.





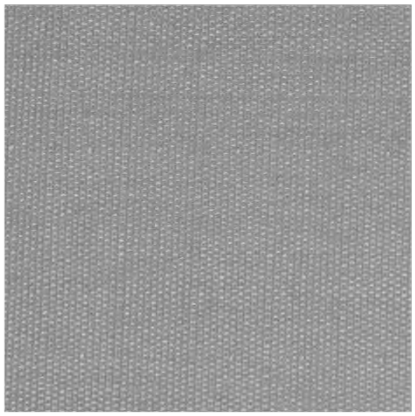
textile sample 35
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:** herringbone | **draft:** double straight |

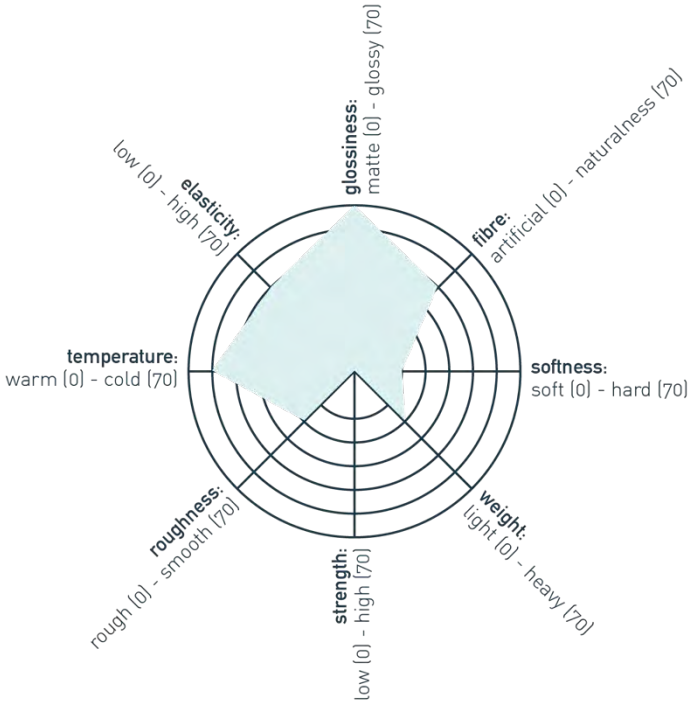




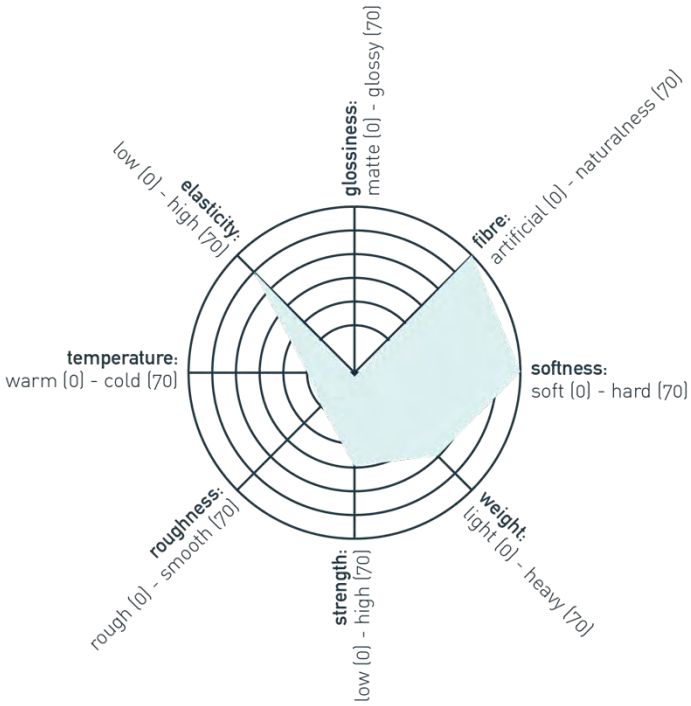
textile sample 36
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:** sateen | **draft:** double straight |

Figure 7. 24. Radar chart textile samples 35 and 36.





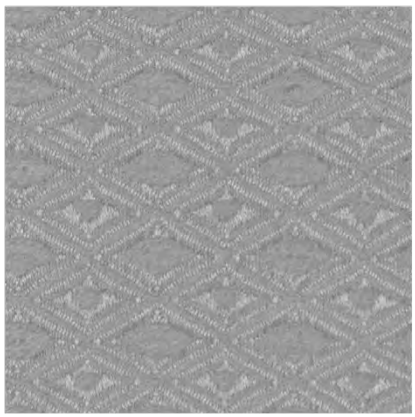
textile sample 37
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:** half basket | **draft:** double pointed |

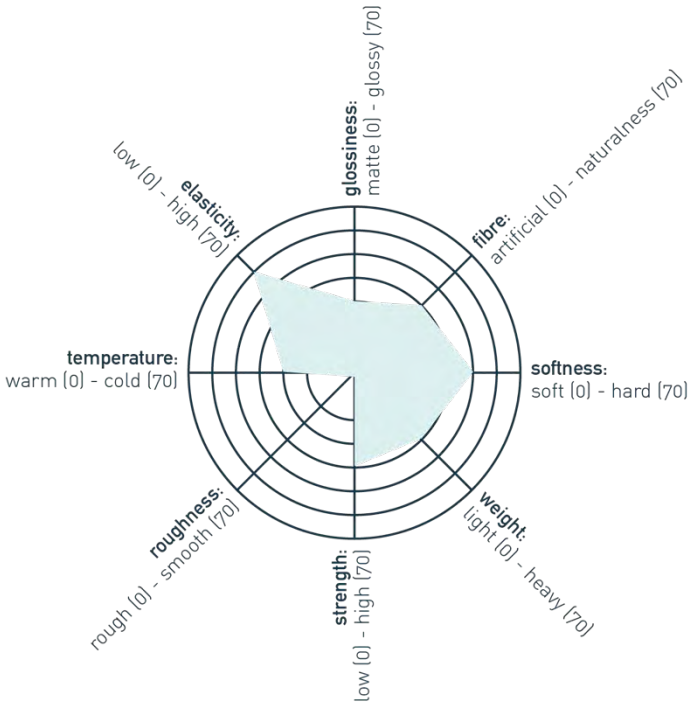


textile sample 38
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:** twill | **draft:** double pointed |

Figure 7. 25. Radar chart textile samples 37 and 38.

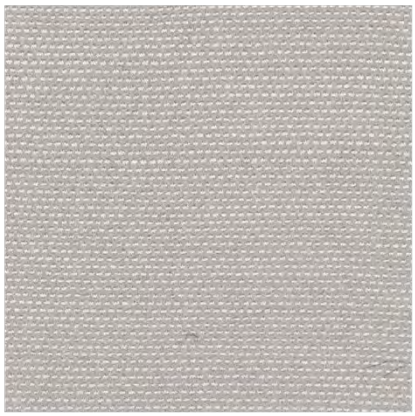
textile sample 39
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:** herringbone | **draft:** double pointed |

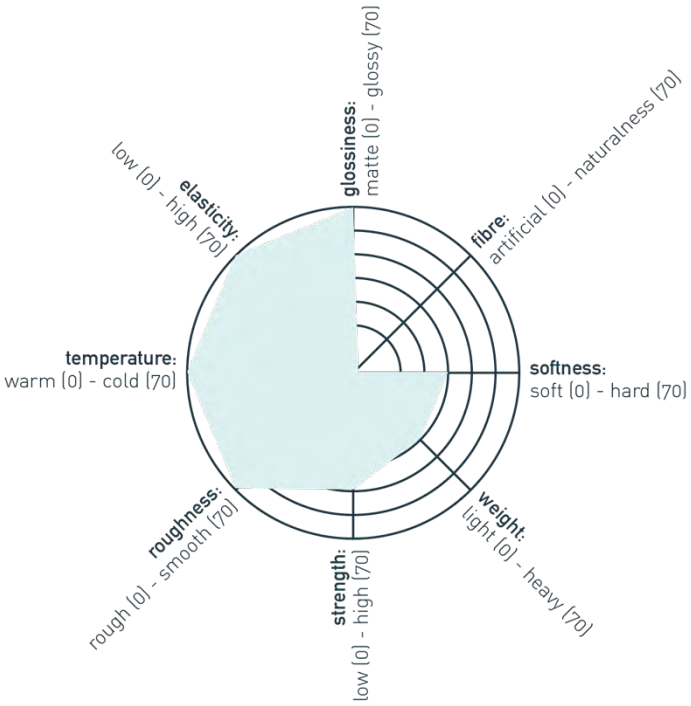




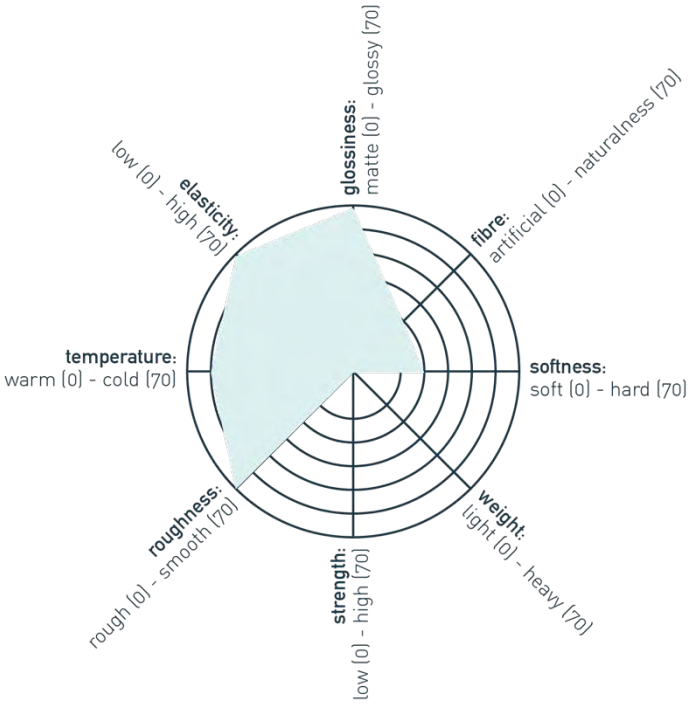
textile sample 40
| **warp:** 2/120s nm spun silk | **weft:** 2/48 nm merino wool |
| **structure:**diamond | **draft:** double ponted |

Figure 7. 26. Radar chart textile samples 39 and 40.



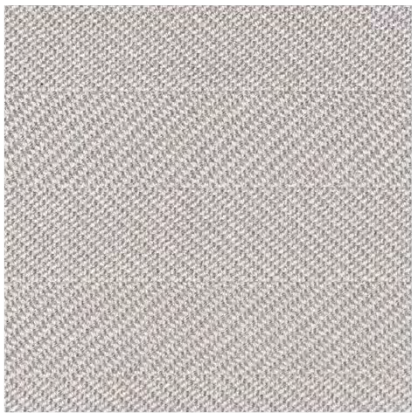


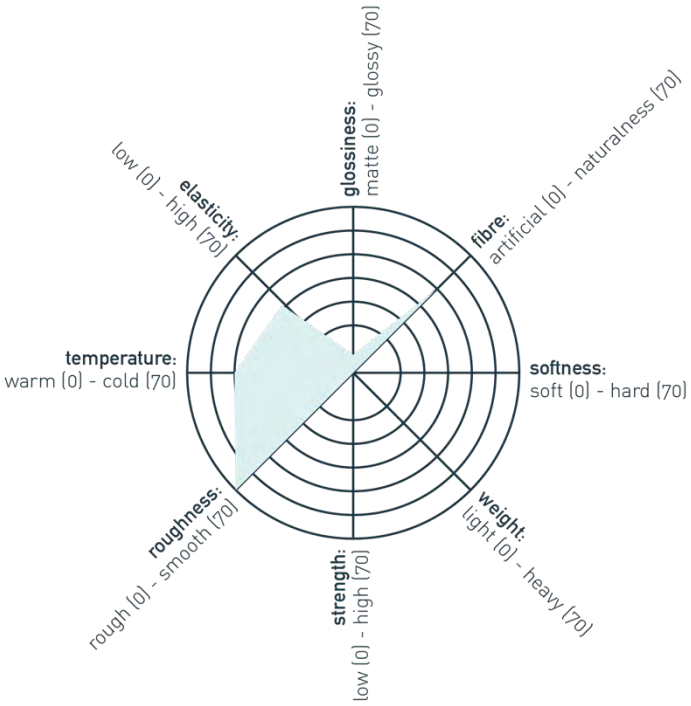
textile sample 41
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** plain | **draft:** double straight |



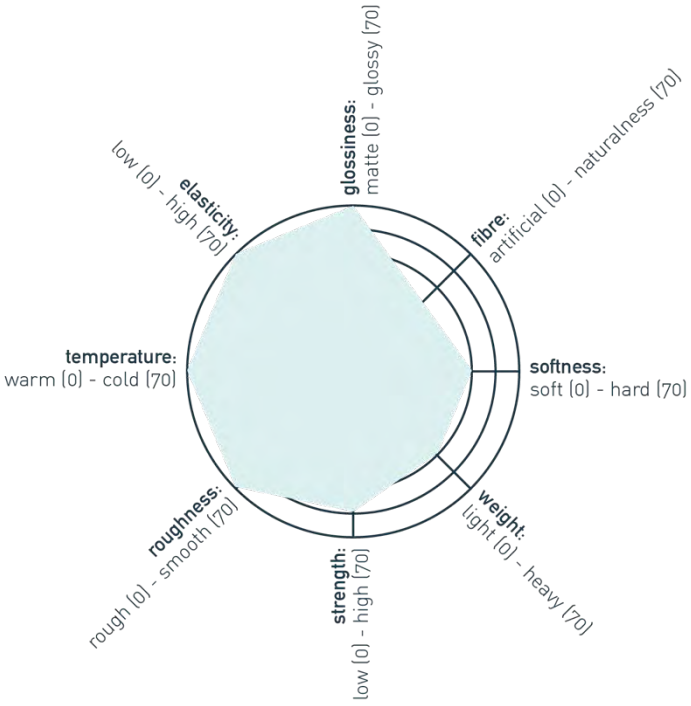
textile sample 42
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** twill | **draft:** double straight |

Figure 7. 27. Radar chart textile samples 41 and 42.



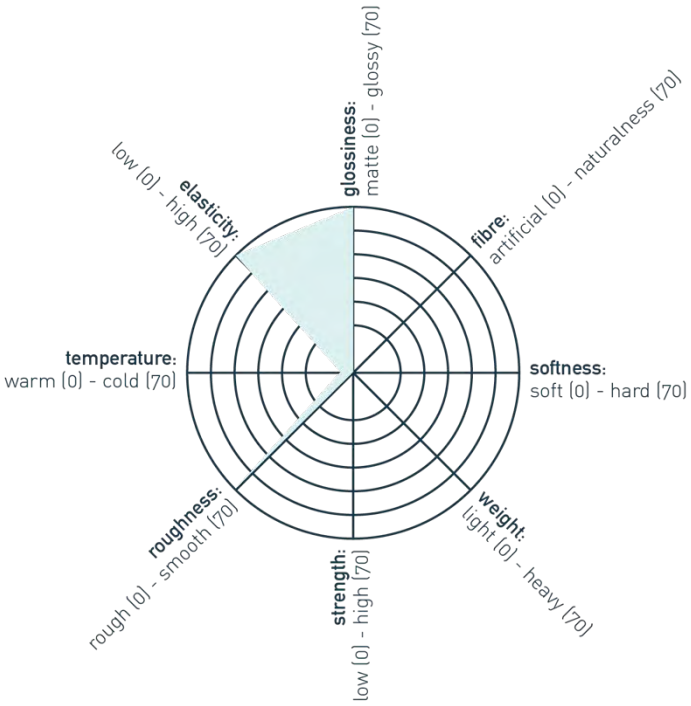


textile sample 43
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** herringbone | **draft:** double straight |

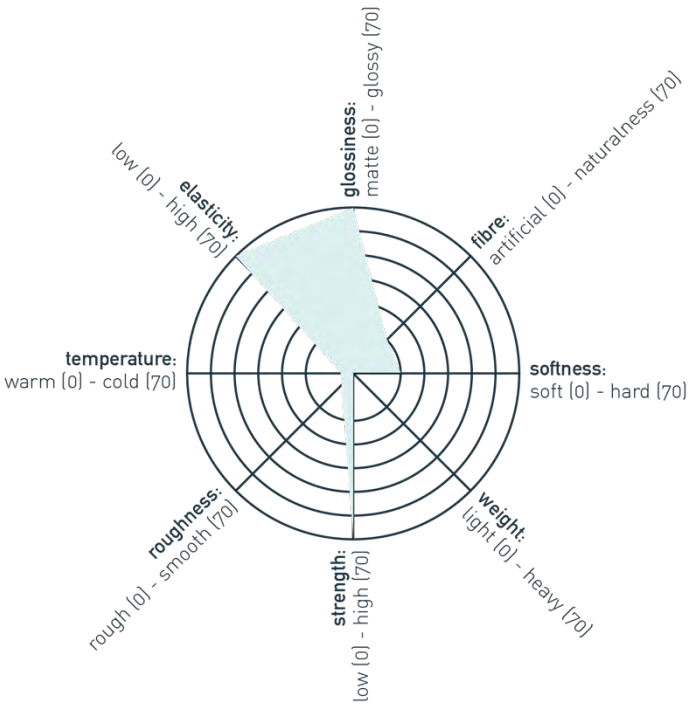


textile sample 44
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** sateen | **draft:** double straight |

Figure 7. 28. Radar chart textile samples 43 and 44.

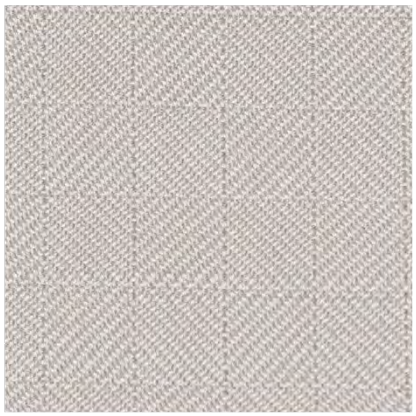


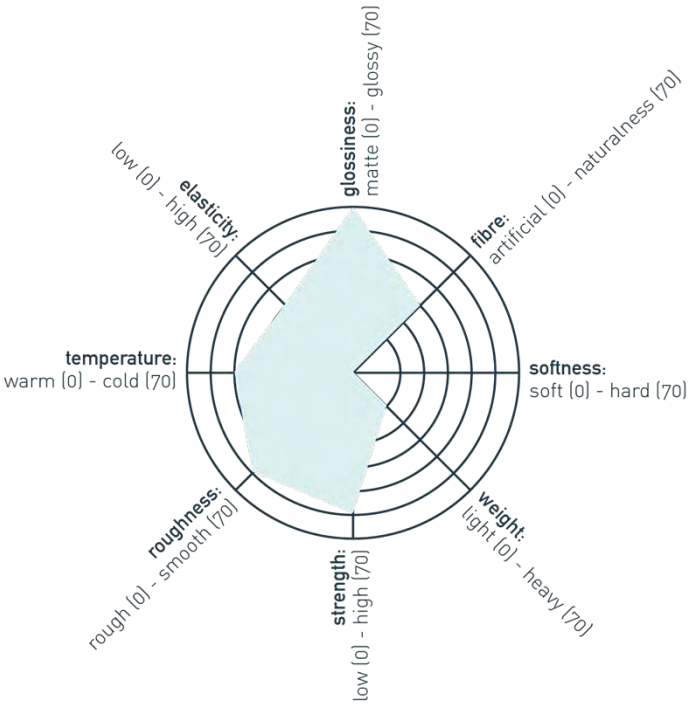
textile sample 45
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** half basket | **draft:** double pointed |



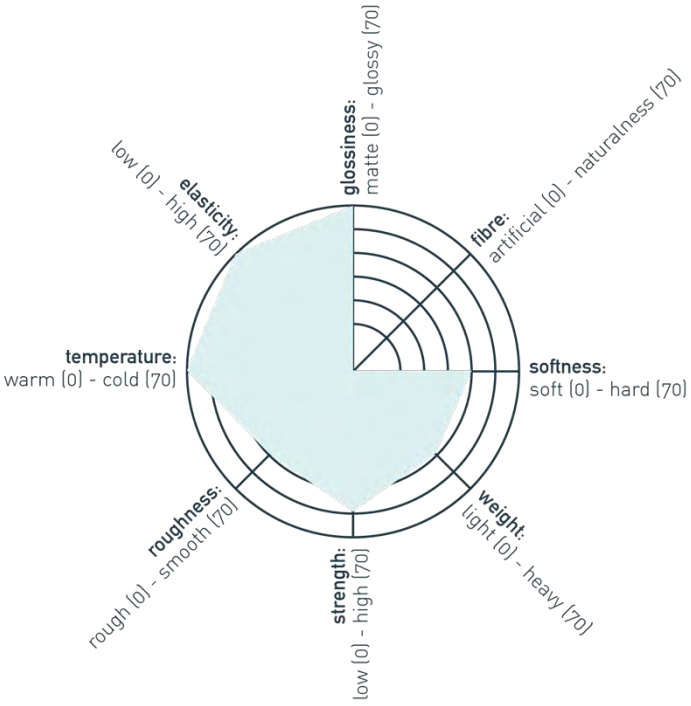
textile sample 46
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** twill | **draft:** double pointed |

Figure 7. 29. Radar chart textile samples 45 and 46.





textile sample 47
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** herringbone | **draft:** double pointed |



textile sample 48
| **warp:** 2/120s nm spun silk | **weft:** 2/120s nm spun silk
| **structure:** diamond | **draft:** double pointed |

Figure 7. 30. Radar chart textile samples 47 and 48.

7.4. APPENDIX D: REPERTORY GRID TECHNIQUE SHEETS

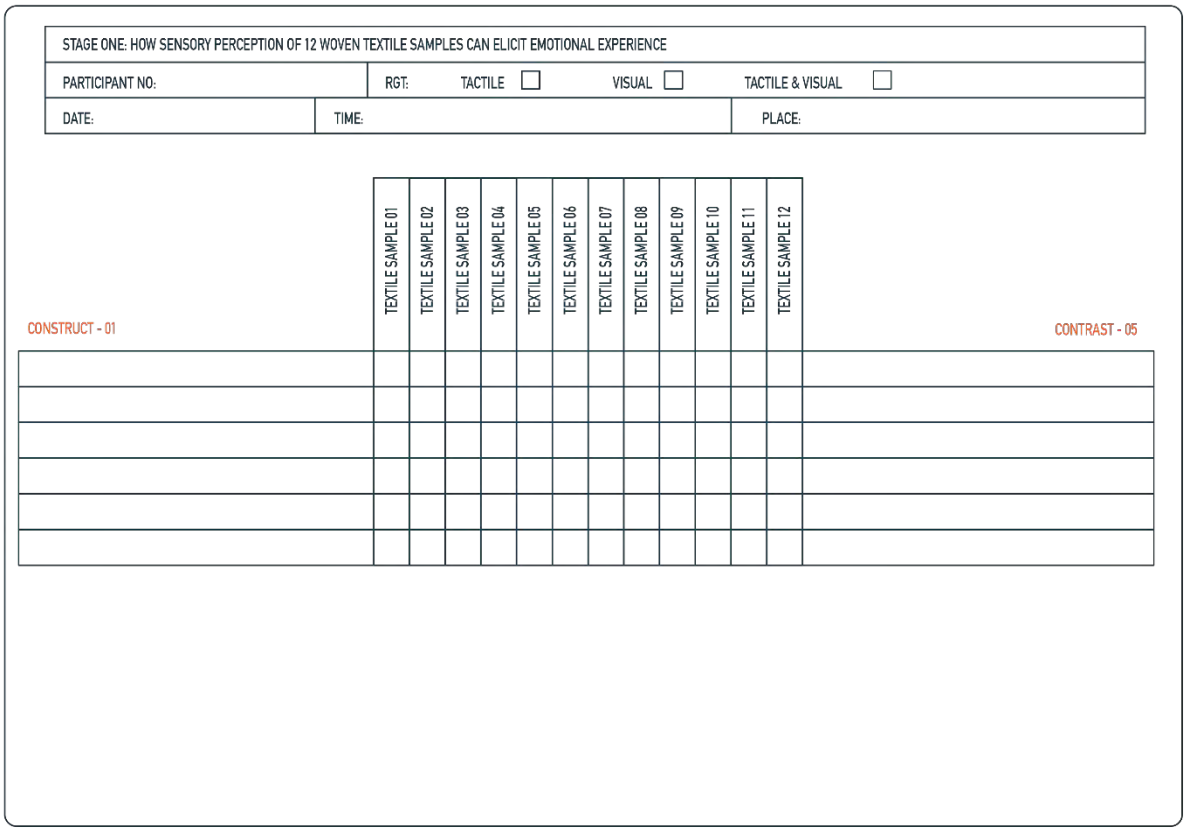
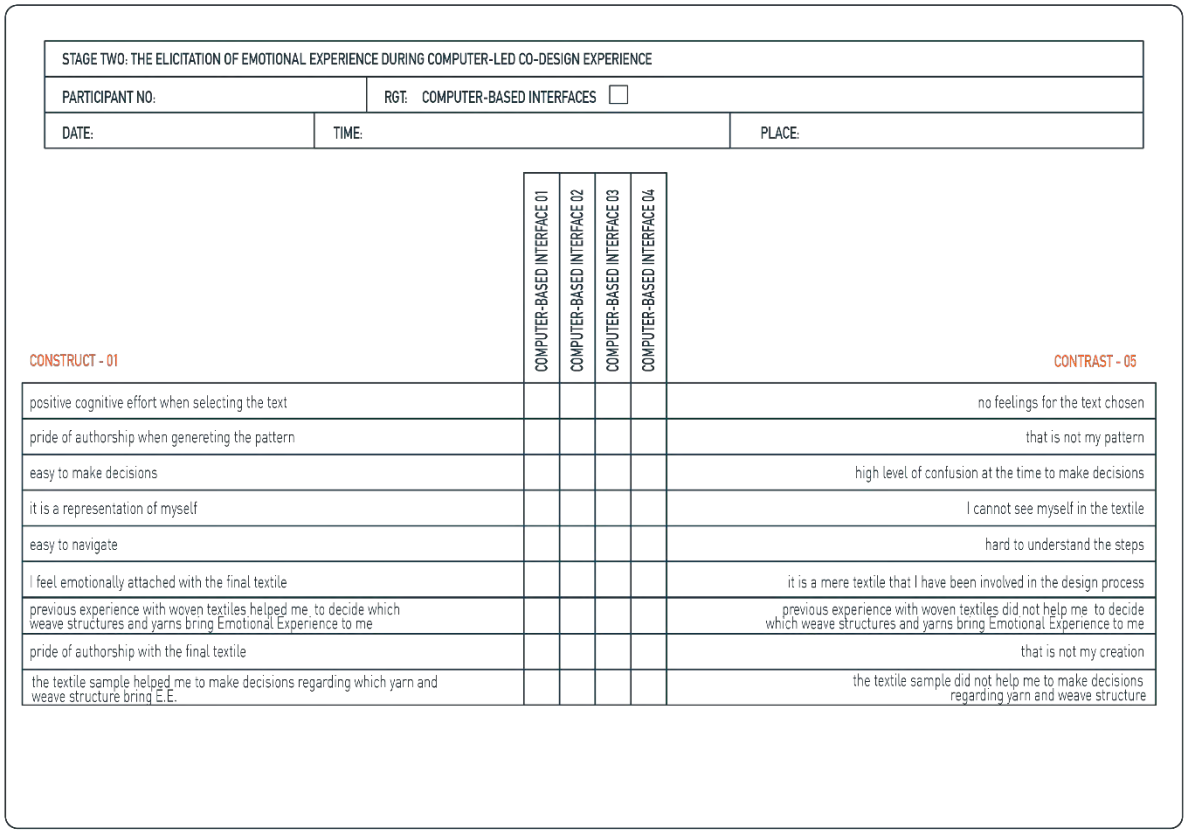


Figure 7. 31. Stage one Repertory Grid Technique sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO:	RGT: COMPUTER-BASED INTERFACES ☐	
DATE:	TIME:	PLACE:

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text					no feelings for the text chosen
pride of authorship when genereting the pattern					that is not my pattern
easy to make decisions					high level of confusion at the time to make decisions
it is a representation of myself					I cannot see myself in the textile
easy to navigate					hard to understand the steps
I feel emotionally attached with the final textile					it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me					previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile					that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.					the textile sample did not help me to make decisions regarding yarn and weave structure

Figure 7. 32. Stage two Repertory Grid Technique sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: | RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ☐

DATE: | TIME: | PLACE:

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
tactile unimodal analysis RGT bi-polar construct					tactile unimodal analysis RGT bi-polar contrast
tactile unimodal analysis RGT bi-polar construct					tactile unimodal analysis RGT bi-polar contrast
tactile unimodal analysis RGT bi-polar construct					tactile unimodal analysis RGT bi-polar contrast
tactile unimodal analysis RGT bi-polar construct					tactile unimodal analysis RGT bi-polar contrast
tactile unimodal analysis RGT bi-polar construct					tactile unimodal analysis RGT bi-polar contrast
tactile unimodal analysis RGT bi-polar construct					tactile unimodal analysis RGT bi-polar contrast
visual unimodal analysis RGT bi-polar construct					visual unimodal analysis RGT bi-polar contrast
visual unimodal analysis RGT bi-polar construct					visual unimodal analysis RGT bi-polar contrast
visual unimodal analysis RGT bi-polar construct					visual unimodal analysis RGT bi-polar contrast
visual unimodal analysis RGT bi-polar construct					visual unimodal analysis RGT bi-polar contrast
visual unimodal analysis RGT bi-polar construct					visual unimodal analysis RGT bi-polar contrast
visual unimodal analysis RGT bi-polar construct					visual unimodal analysis RGT bi-polar contrast
tactile-visual bimodal analysis RGT bi-polar construct					tactile-visual bimodal analysis RGT bi-polar contrast
tactile-visual bimodal analysis RGT bi-polar construct					tactile-visual bimodal analysis RGT bi-polar contrast
tactile-visual bimodal analysis RGT bi-polar construct					tactile-visual bimodal analysis RGT bi-polar contrast
tactile-visual bimodal analysis RGT bi-polar construct					tactile-visual bimodal analysis RGT bi-polar contrast
tactile-visual bimodal analysis RGT bi-polar construct					tactile-visual bimodal analysis RGT bi-polar contrast
tactile-visual bimodal analysis RGT bi-polar construct					tactile-visual bimodal analysis RGT bi-polar contrast
pride of authorship					that is not my creation
I feel emotionally attached with the final creation					I have just been involved in the design process
the text helped to load the textile with E.E.					the text did not help at all
the coded pattern helped to load the textile with E.E.					the coded pattern did not help at all

Figure 7. 33. Stage three Repertory Grid Technique sheet. Each participant had their own RGT bi-polar constructs.

7.5. APPENDIX E: STAGE ONE REPERTORY GRID TECHNIQUE INTERVIEWS

Participant A

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT A | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 27.09.2019 | TIME: 3 PM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
it reminds me of cloths that I used to have	4	1	2	3	4	2	5	1	3	4	1	4	curtain fabric - less personal
flatter texture (something that I used to have)	2	3	1	5	2	1	4	3	4	1	3	5	Primary teacher used to wear
grandma's table cloth, thinner, more worn, specific	4	1	2	4	1	3	5	2	3	1	4	5	thicker, curtain fabric (to be there but not allow to touch it or play with)
jumper not as comfortable as expected, expected to wear it once	4	2	3	1	3	5	3	4	5	4	2	5	closer to what I would wear just now
texture, flatter, newer	2	4	3	5	2	1	4	5	2	3	1	4	nice contract to it, carpet texture (school carpet)
clothes that I would pick up for myself	2	5	4	3	2	3	1	4	1	5	1	3	mum used to pick up for me

Table 7. 6. Participant A - tactile unimodal analysis RGT sheet.

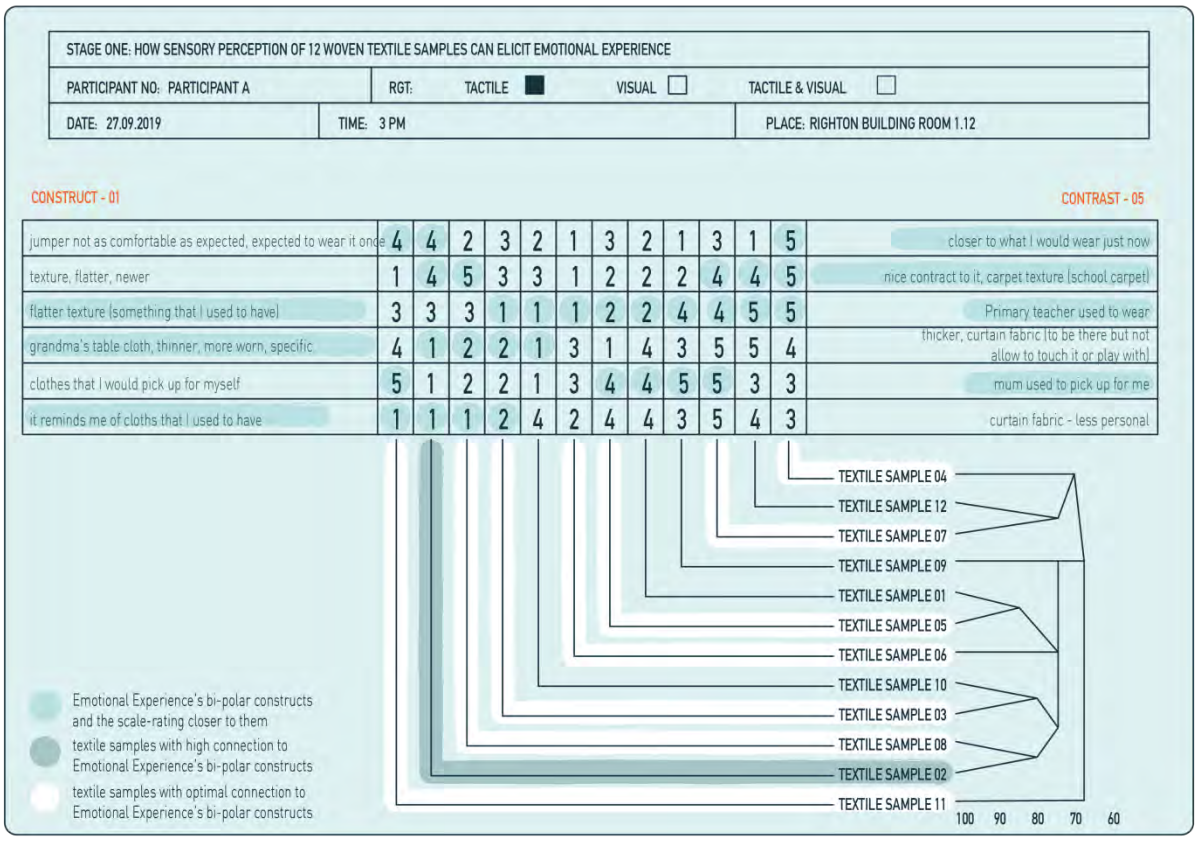


Table 7. 7. Participant A - tactile unimodal analysis RGT sheet focus cluster analysis.

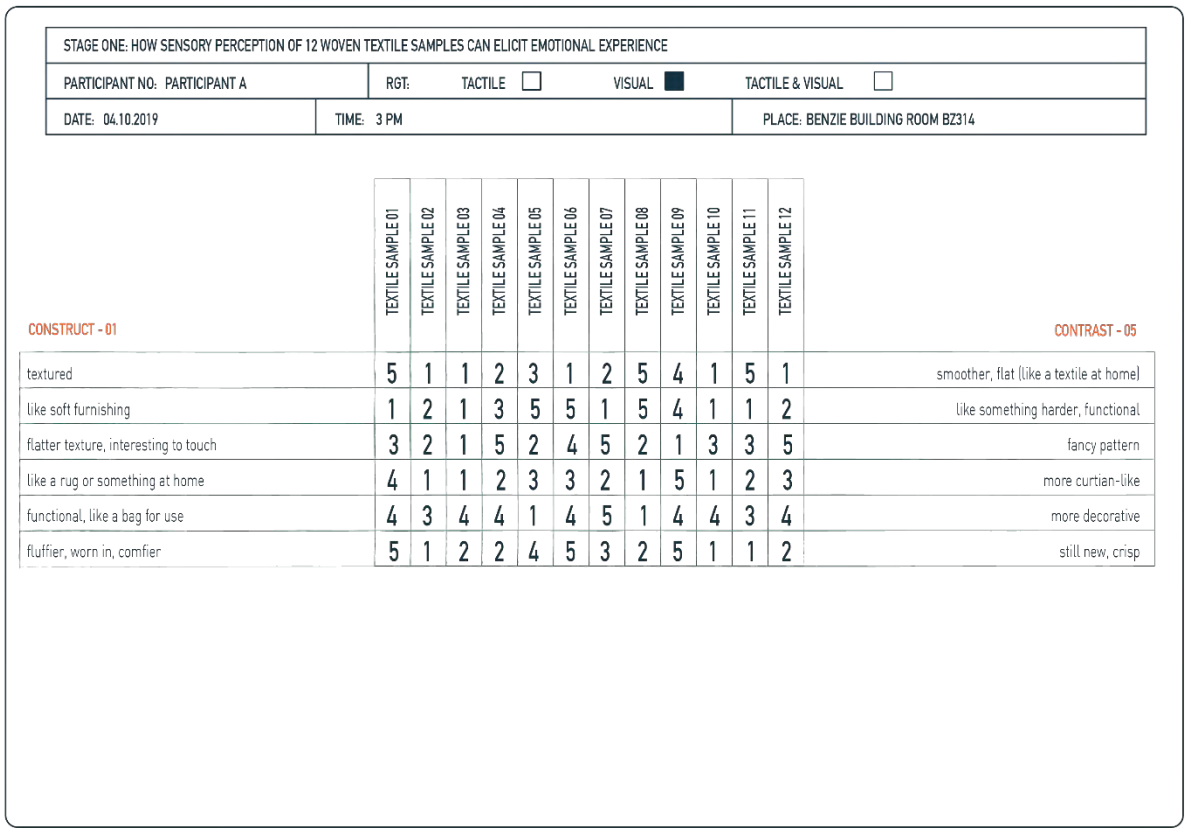


Table 7. 8. Participant A - visual unimodal analysis RGT sheet.

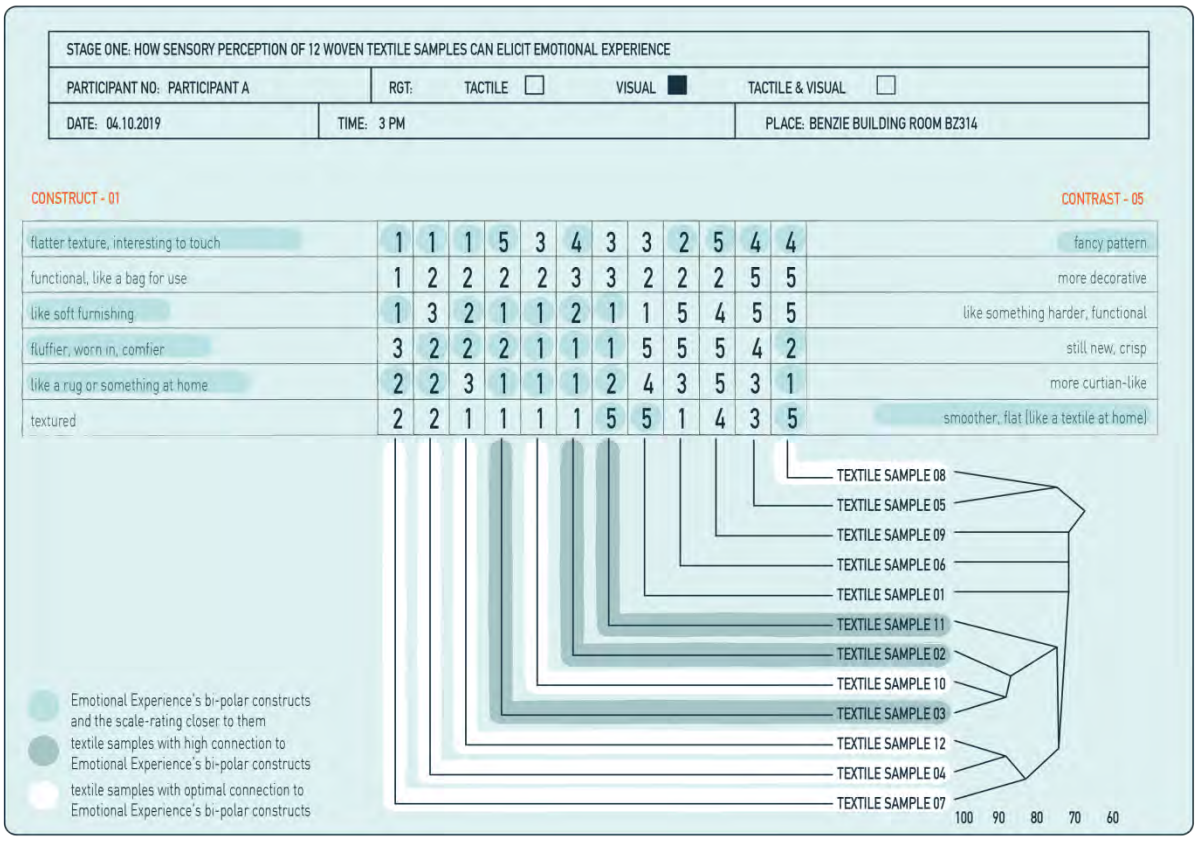


Table 7. 9. Participant A - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT A | RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■

DATE: 11.10.2019 | TIME: 3 PM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
softer pattern, homely	5	1	1	3	1	2	3	3	4	1	4	4	stiffer - formal
something that I'd buy it or have for myself	4	2	3	5	2	4	1	4	3	3	2	4	reminds me of something of my grandpa's house
fancy pattern, flat and movable	1	4	2	4	3	1	2	5	1	2	2	1	a little bit scratchy
visual thing, heavily patterned	3	2	4	1	5	2	5	4	1	2	4	1	something that you see and use everyday
more worn - seen a lot of years	5	2	2	2	1	4	2	1	4	1	4	3	newer, sharpper
texture thing, smoother, they feel thicker	1	4	4	3	3	4	3	3	2	4	1	2	has more texture, ribs of the table cloth

Table 7. 10. Participant A - tactile-visual bimodal analysis RGT sheet.

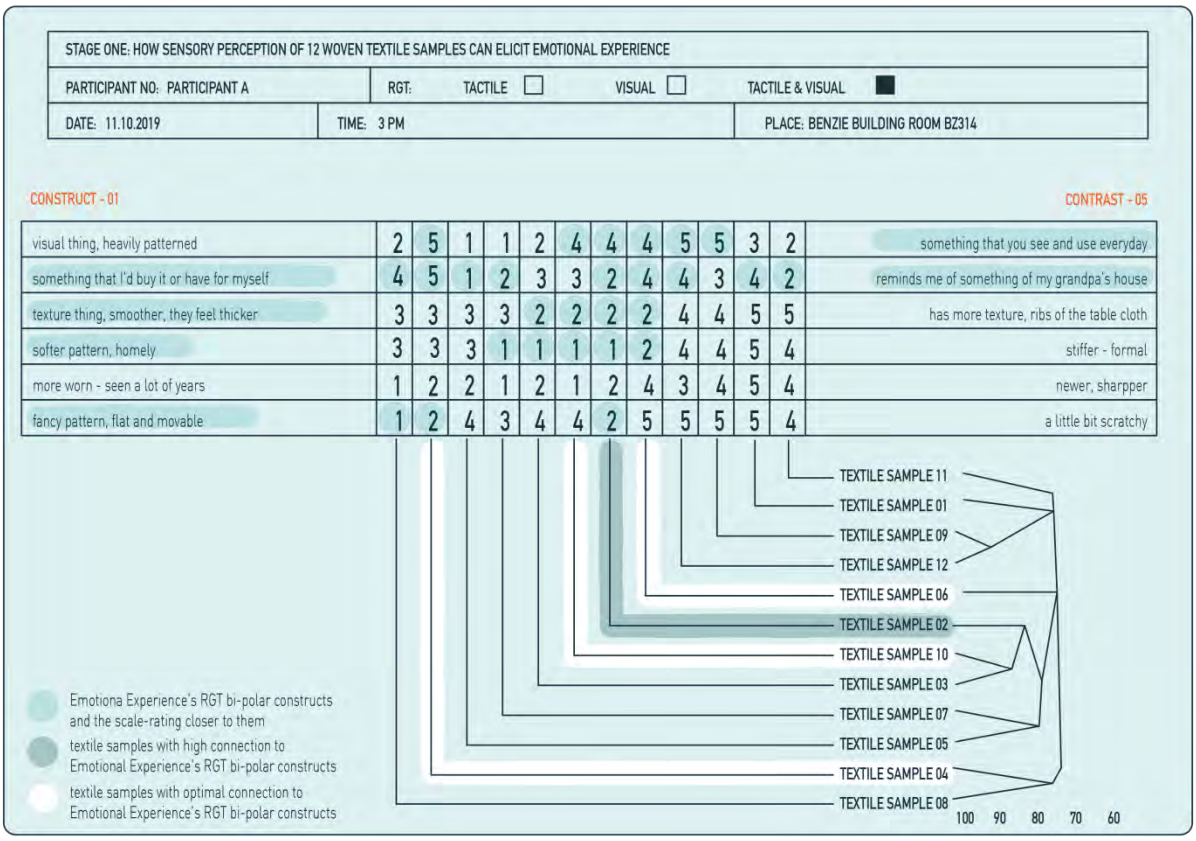


Table 7. 11. Participant A - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

Participant B

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT B | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 07.10.2019 | TIME: 1 PM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
a satin sofa - I have one like that	4	1	1	2	1	2	2	2	4	2	5	2	silk bedding
soft and harsh - A tote bag	2	2	1	5	2	2	4	2	2	5	2	5	harsh material - traditional welsh cloth, I think it's brown
neutral in colour, similar texture that tote bags	5	2	2	2	2	5	2	2	5	2	4	1	nicer material because it's softness and bright colour
like a velvety coat, mum's coat with stone colour	1	4	5	4	5	2	4	4	2	4	2	5	feels like the sofa again - ot leather sofa
rigit, stitches in and out	4	2	2	1	4	5	2	2	4	2	5	1	softer and flat surface
rubbing the sofa, it's a little bit worn	4	2	4	2	1	5	2	2	5	2	5	1	I like it the most. It feels it is a new sofa

Table 7. 12. Participant B - tactile unimodal analysis RGT sheet.

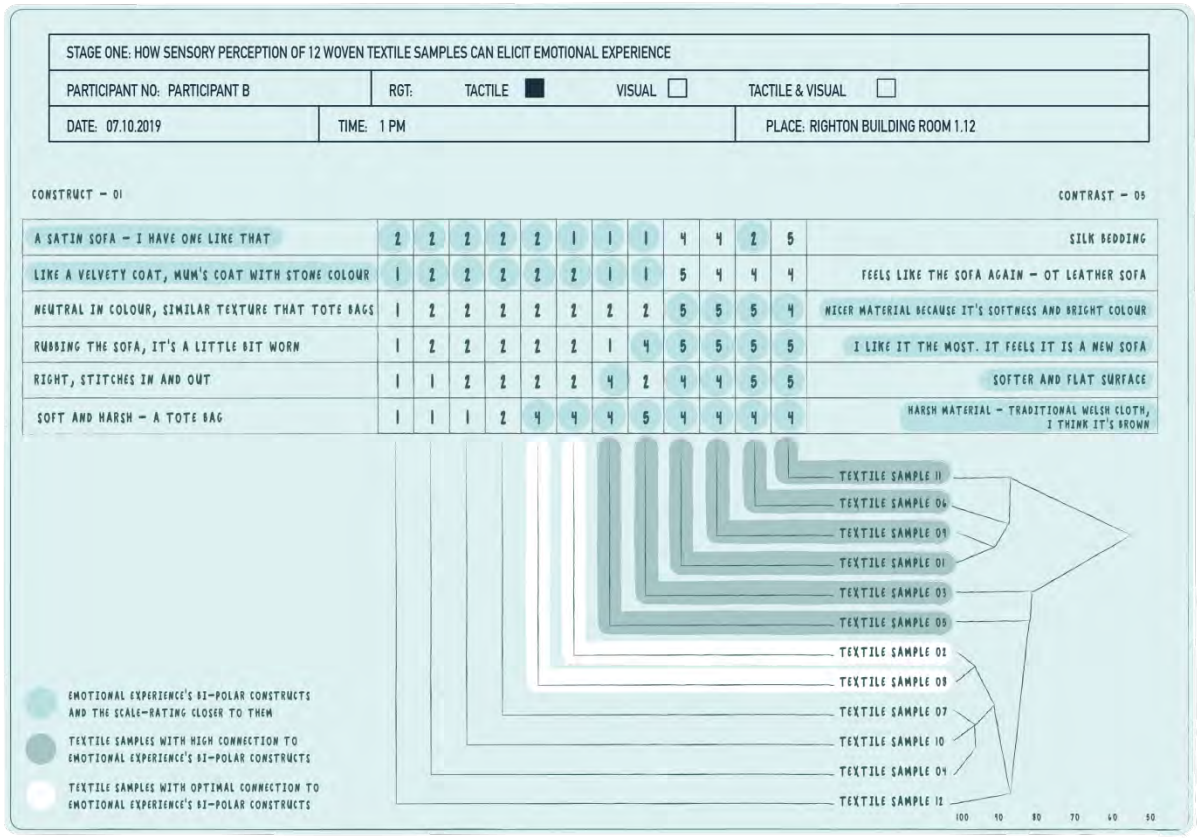


Table 7. 13. Participant B - tactile unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE		
PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ☐ VISUAL ■	TACTILE & VISUAL ☐
DATE: 14.10.2019	TIME: 10:30 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
woven rug	5	1	2	2	5	1	2	1	4	1	5	3	bed throw
middle easter fabric	4	2	3	1	5	2	1	4	1	2	4	1	reusable bag
squares - kaleidoscope	3	4	2	4	3	4	5	3	1	3	3	4	layer of pattern
same yarn/ material	2	4	4	5	2	5	3	4	2	5	2	1	sheep weel tribal print
tiles	1	2	2	5	3	3	5	2	5	3	3	5	kaleidoscope
tapestry	3	5	5	2	2	1	2	4	2	1	3	2	school carpet

Table 7. 14. Participant B - visual unimodal analysis RGT sheet.

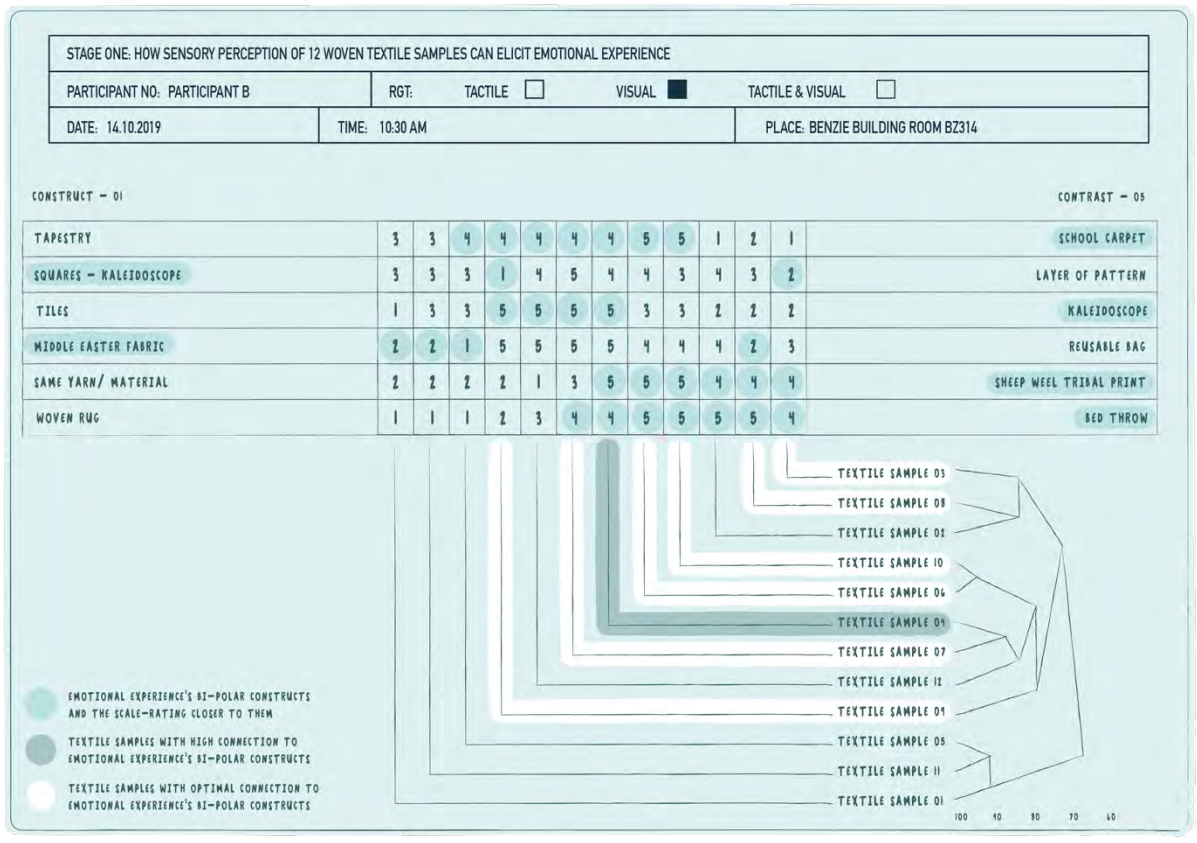


Table 7. 15. Participant B - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 21.10.2019	TIME: 3 PM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
textured	5	1	1	1	2	1	3	2	2	1	5	1	plain
softer	2	4	5	4	4	4	2	1	4	5	1	3	none rough
squares	3	3	3	5	3	3	5	1	1	3	3	4	triangle
soft - similar feeling on the back	1	5	4	3	3	5	2	2	4	4	1	3	hard wearing tough
bits that are raised	5	2	2	1	3	2	5	5	5	2	5	1	flat surface
thinner thread, same colour	2	4	4	4	5	4	1	1	5	5	2	2	natural material

Table 7. 16. Participant B - tactile-visual bimodal analysis RGT sheet.

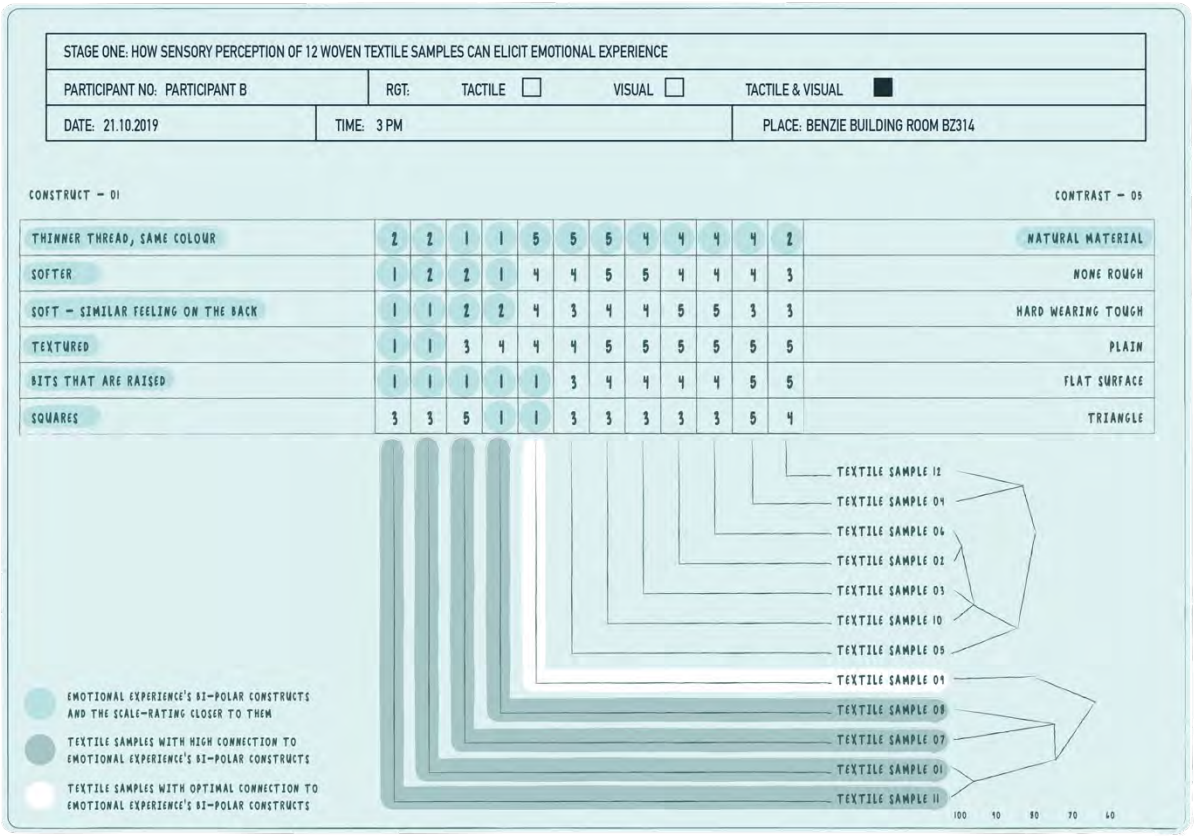


Table 7. 17. Participant B - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

Participant C

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT C | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 04.10.2019 | TIME: 10 AM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
tail of a horse	5	2	1	3	4	2	1	3	5	1	1	3	smooth, bed sheet
tablecloth. Feel the underneeth	2	4	4	5	1	2	2	5	1	5	4	5	I don't like it at all, it doesn't feel nice. Scarf/blanket that looses the fibers
I like these, personal like, they are smooth	1	4	4	5	2	3	3	5	1	5	4	5	I don't like the loose bit of fibre coming out
animal life again	3	3	3	4	3	3	3	3	3	1	3	5	bits of threads and lines, it feels softer, but I could pull it apart
rough - blanket that fibres come out	5	2	4	1	5	4	4	1	5	1	2	1	smooth, I feel I don't have anything on my hands
bounce on top, has layers, like high scool carpet	5	2	2	1	5	4	5	2	4	2	3	3	flat, it doesn't remind me of anything in particular

Table 7. 18. Participant C - tactile unimodal analysis RGT sheet.

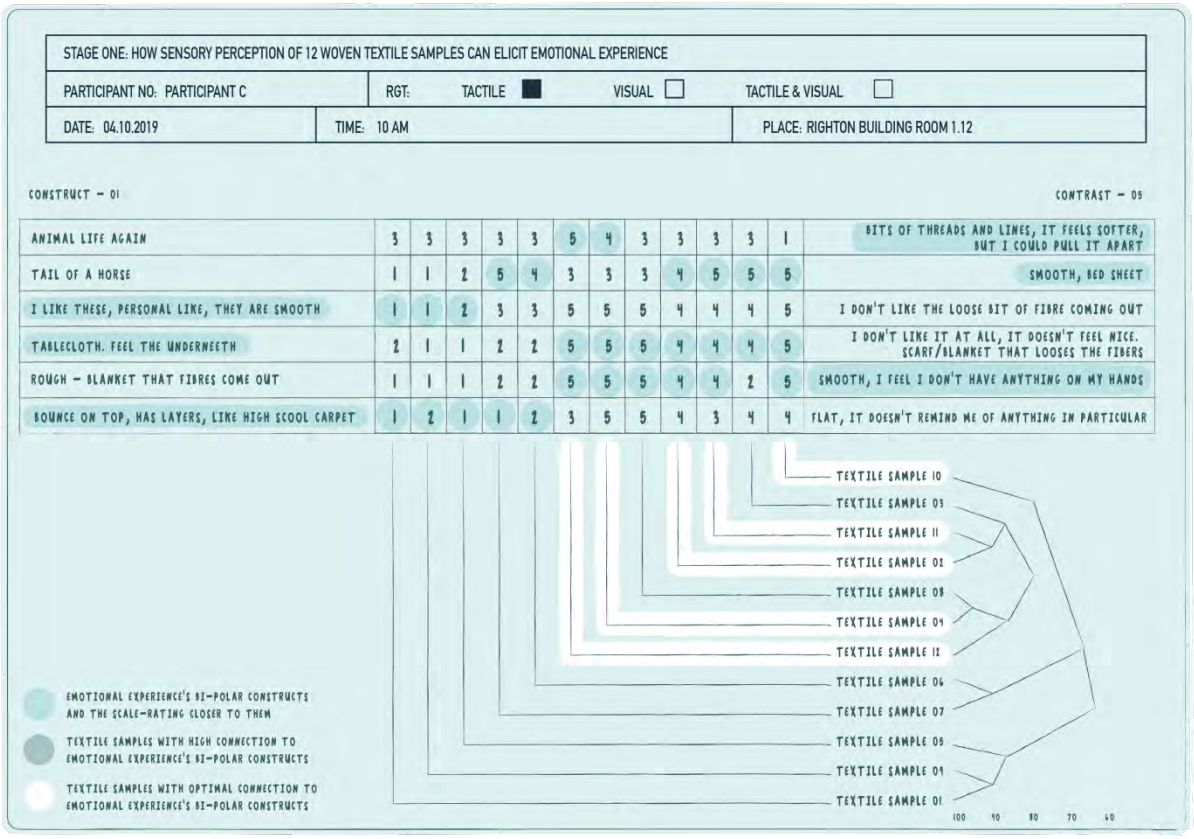


Table 7. 19. Participant C - tactile unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE		
PARTICIPANT NO: PARTICIPANT C	RGT: TACTILE ☐ VISUAL ■	TACTILE & VISUAL ☐
DATE: 11.10.2019	TIME: 10 AM	PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
reminds me of a blanket at home	5	1	1	4	5	1	4	5	5	1	2	5	doesn't remind me of anything
vintage old patterns on curtains	5	3	3	1	5	2	1	3	5	3	4	1	plain, flat like a cloth, napkin - italian resturatnt
shiny, neckets light, old grandma cloths	1	4	3	2	2	3	1	5	1	3	3	1	dry, potato bag
doesn't remind me of anything	3	3	3	2	2	1	2	1	1	2	5	1	pillow case, soft and flat, similar to my grey one
textile around the house	1	2	1	1	3	2	2	5	1	1	1	1	potato bag, rough
ripples in the sand on the beach near water	5	3	3	5	4	1	5	5	5	1	5	5	doesn't remind me of anything

Table 7. 20. Participant C - visual unimodal analysis RGT sheet.

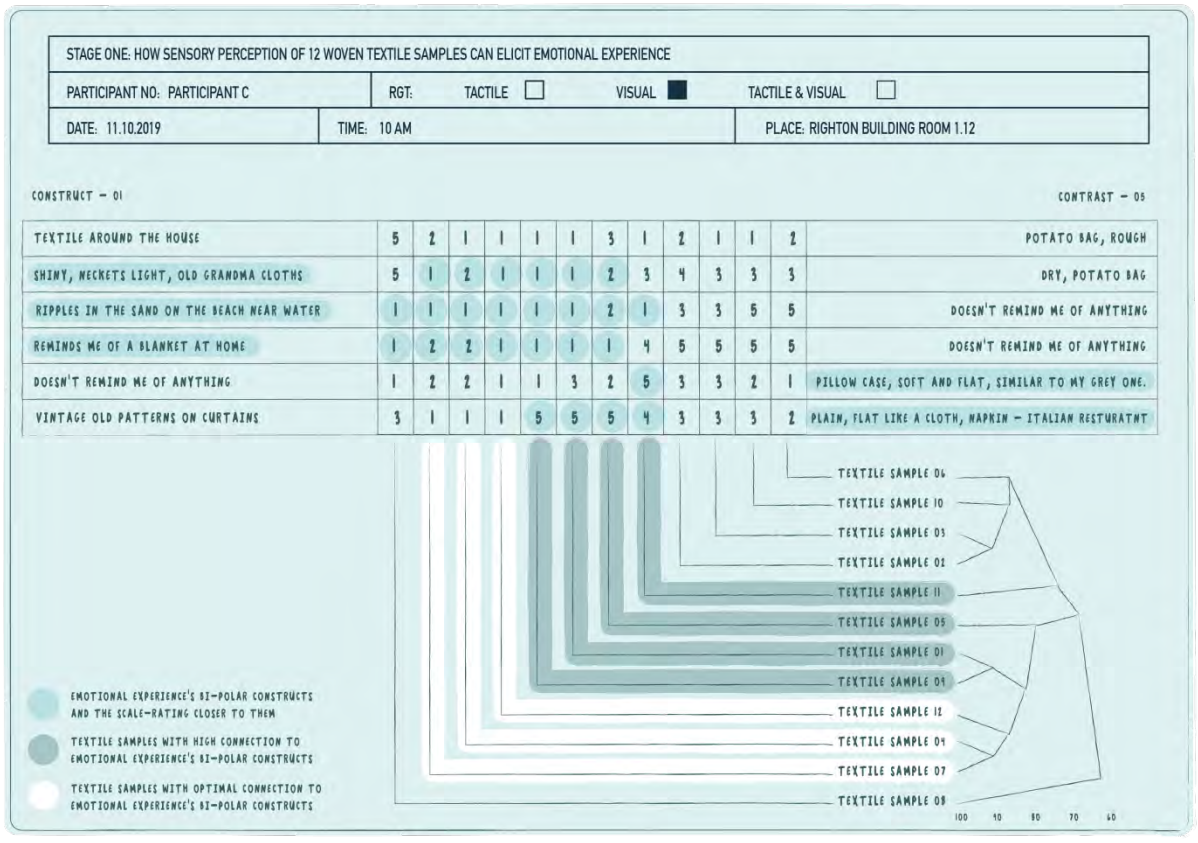


Table 7. 21. Participant C - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE		
PARTICIPANT NO: PARTICIPANT C	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 18.10.2019	TIME: 10 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
a blanket that I have at home, because the diagonal weave	5	1	2	3	4	2	3	3	5	1	3	3	silky and smooth - italian restaurant napkin
nothing in particular - smooth and flat, I like them	1	3	3	5	1	3	4	4	1	3	2	5	Grandma sofa's cover. It's really old (horrible and ugly)
they are both smooth and silky	1	3	3	3	3	1	2	5	1	3	2	3	vegetable bag, where I store the potatoes
vintage blanket	4	2	3	1	4	2	2	3	4	1	5	2	plain, without texture. It could be a pillow case. Something ot have on the bed
blanket at home	5	1	2	3	4	2	3	4	4	1	5	3	very flat
fancy and more interesting because of the pattern	5	3	3	2	4	1	1	3	1	3	3	1	no texure or pattern - restaurant napkin

Table 7. 22. Participant C - tactile-visual bimodal analysis RGT sheet.

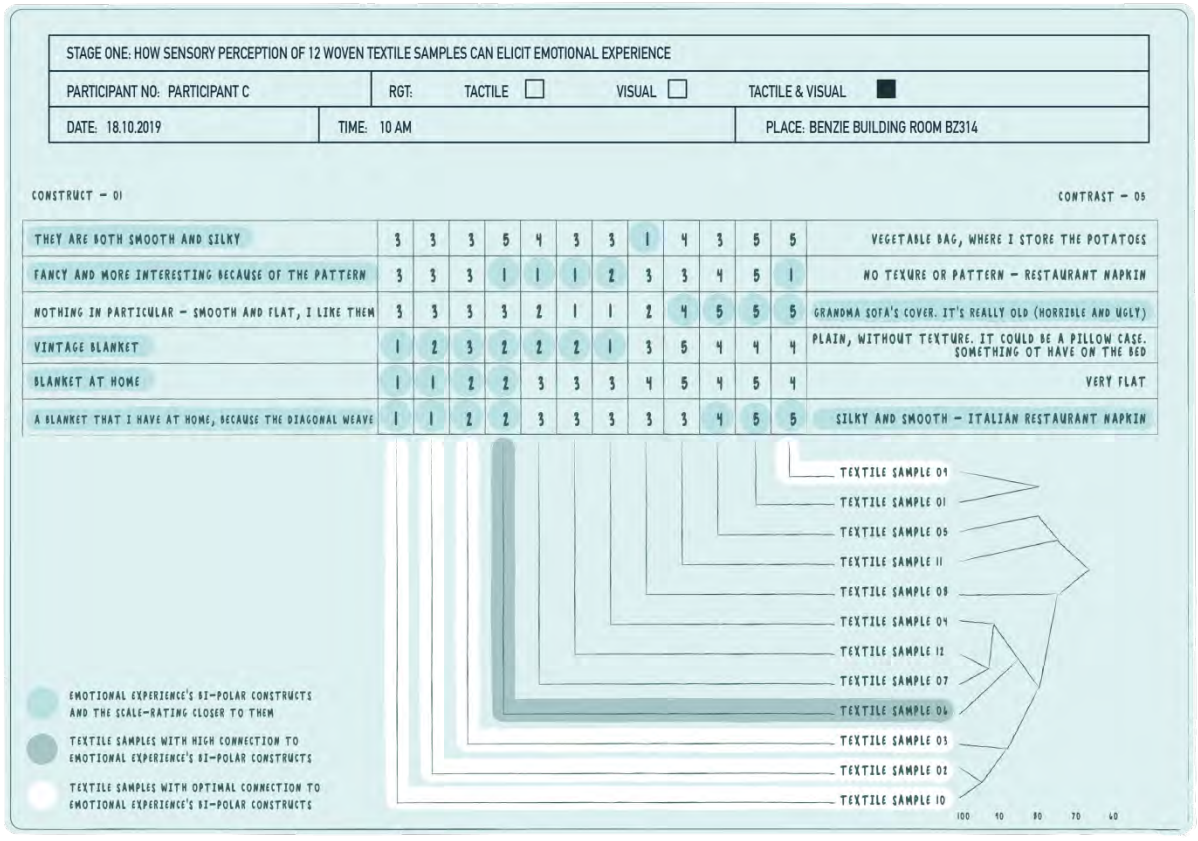


Table 7. 23. Participant C - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

Participant D

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT D | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 22.10.2019 | TIME: 1:30 PM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
clothes that I have owned. Trausers that they look nice but to hot to wear them	4	5	4	3	4	3	4	5	4	1	4	1	I don't like it, the fabric feels like sketching my nails an a blackboard
I don't like them, school uniform. Itchy and horrible clothes	2	1	2	5	1	2	4	1	2	2	2	5	outside of a coat. I'm not sure what this is. I've never encountered it
clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	1	4	2	4	3	1	4	4	3	3	4	4	discomfort, comfortable old cushion. Not related to each other, rougher
these are not eliciting any emotional reaction. Similar in one side	3	3	3	1	2	1	4	3	2	3	3	5	nice bag, old cushion. It feels comfortable and familiar
these feel itchy, the touch is horrible	3	1	2	3	2	3	4	1	2	2	2	5	feels comfortable. I'd have a cushion pillow made of this
comfortable grandmother's sofa	1	2	2	2	1	2	4	2	2	4	1	5	it feels more real

Table 7. 24. Participant D - tactile unimodal analysis RGT sheet.

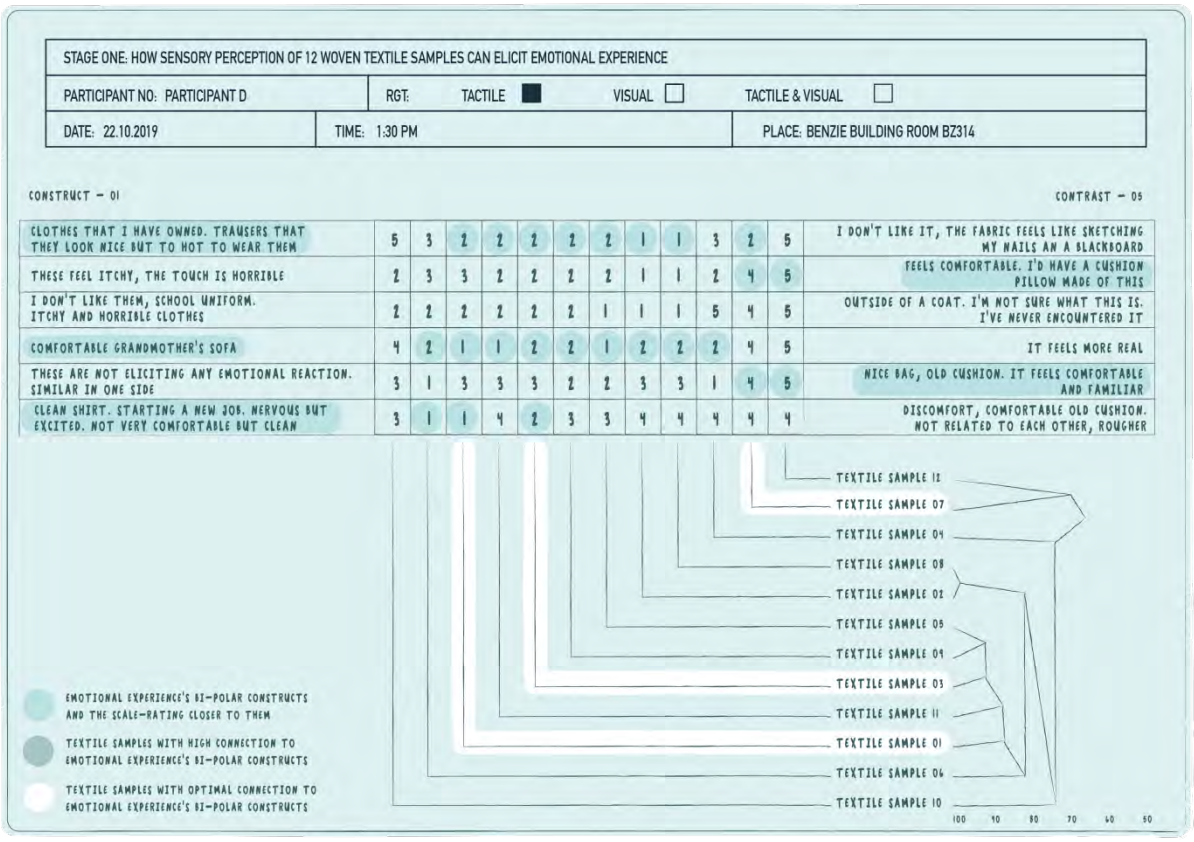


Table 7. 25. Participant D - tactile unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT D | RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐

DATE: 29.10.2019 | TIME: 1:30 PM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
they look soft and silky	2	4	2	4	5	2	1	5	5	4	1	1	looks rougher
they look like things I'd own	3	1	1	1	5	1	1	5	5	3	1	2	too rough, too scratchy
white squares quite hypnotic	4	1	1	4	2	3	5	2	1	3	5	5	soft diamonds, smooth look
neat, perfectly, like the pattern	4	2	2	2	5	1	1	5	1	4	2	1	discoloured and ugly
feel like a fabric already worn	4	1	5	1	5	5	5	1	4	1	5	5	higHer quality
childhood school trip	3	3	3	2	1	3	3	1	3	3	2	2	tea towel, boring

Table 7. 26. Participant D - visual unimodal analysis RGT sheet.

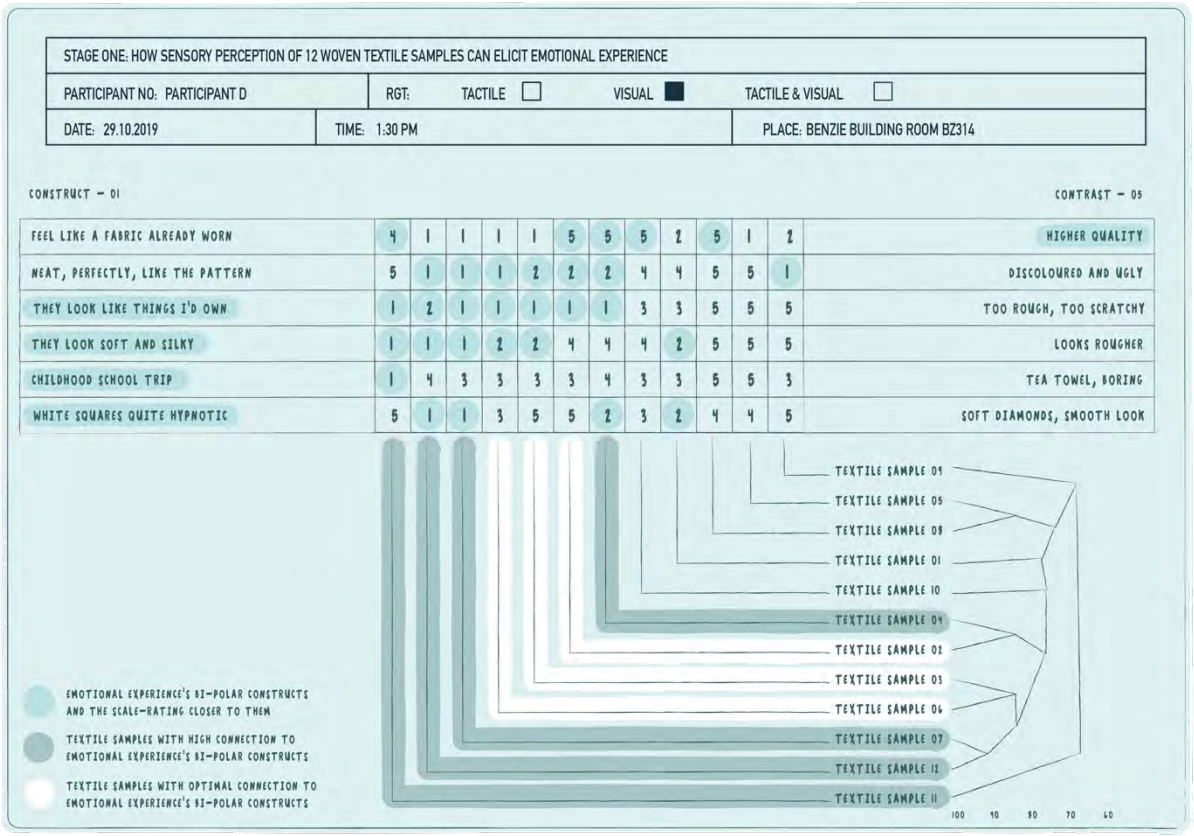


Table 7. 27. Participant D - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT D	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 05.11.2019	TIME: 1:30 PM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
makes me think about getting into bed	3	5	2	4	1	4	5	3	3	4	3	5	reminds me of receiving a post (nice)
like a schoolsportS day (cold)	4	2	2	5	5	3	2	1	3	4	1	5	like a National Trust house
ice-cream cone - trip to grandparents	2	2	1	2	2	4	1	1	3	2	2	2	no emotional response
being warm in a very cold place	1	4	3	5	4	3	2	5	3	1	3	4	factory tour
soft quality	2	4	2	5	3	2	2	5	2	1	3	3	rough quality
summer	2	4	5	4	1	1	2	5	1	5	4	3	winter

Table 7. 28. Participant D - tactile-visual bimodal analysis RGT sheet.

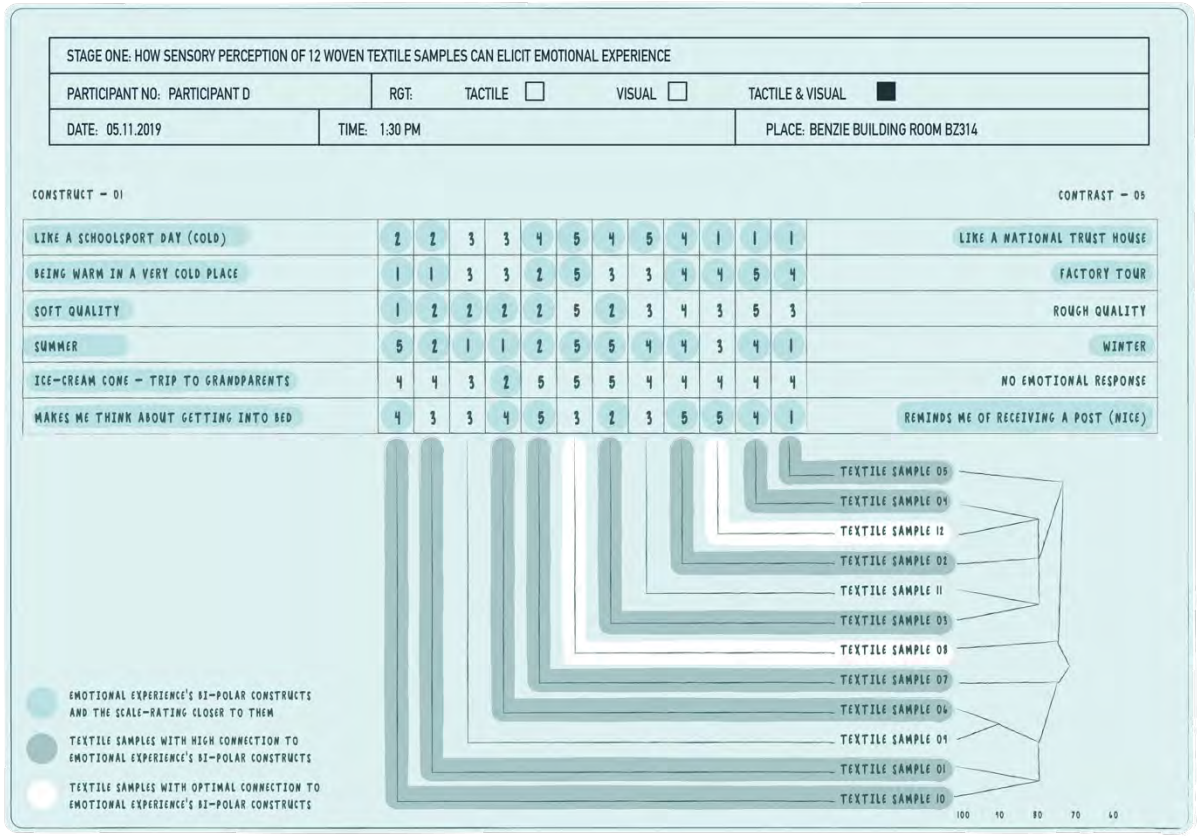


Table 7. 29. Participant D - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

Participant E

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT E | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 24.10.2019 | TIME: 10 AM | PLACE: BENZIE BUILDING ROOM BZ316

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
soft, baby blanket that I used to have when I was a kid	4	1	3	3	4	3	3	3	5	1	2	2	feels synthetic, quite new, not soft. Reminds me of a university project
material from hotel rooms, cushions (dark blue and red /white)	1	4	3	4	1	1	2	2	1	3	3	5	more homely, big green blanket on spare room at home
reminds me of the bed at home that is nicer and mpre comfortable that the one here (student halls)	3	3	3	4	3	3	3	5	3	1	3	4	I don't like it, itchy clothes
granny's - jumpers and clothes	3	2	4	4	3	2	3	4	3	2	3	2	I don't like it as it doesn't feel that nice
Tedy bear at home and the contrast	4	2	1	3	3	1	3	2	5	2	3	2	I can't relate it to anything
bath mats, more worn, rough towelly	3	3	3	1	5	3	1	4	5	2	3	2	tablecloth, smooth in places

Table 7. 30. Participant E - tactile unimodal analysis RGT sheet.

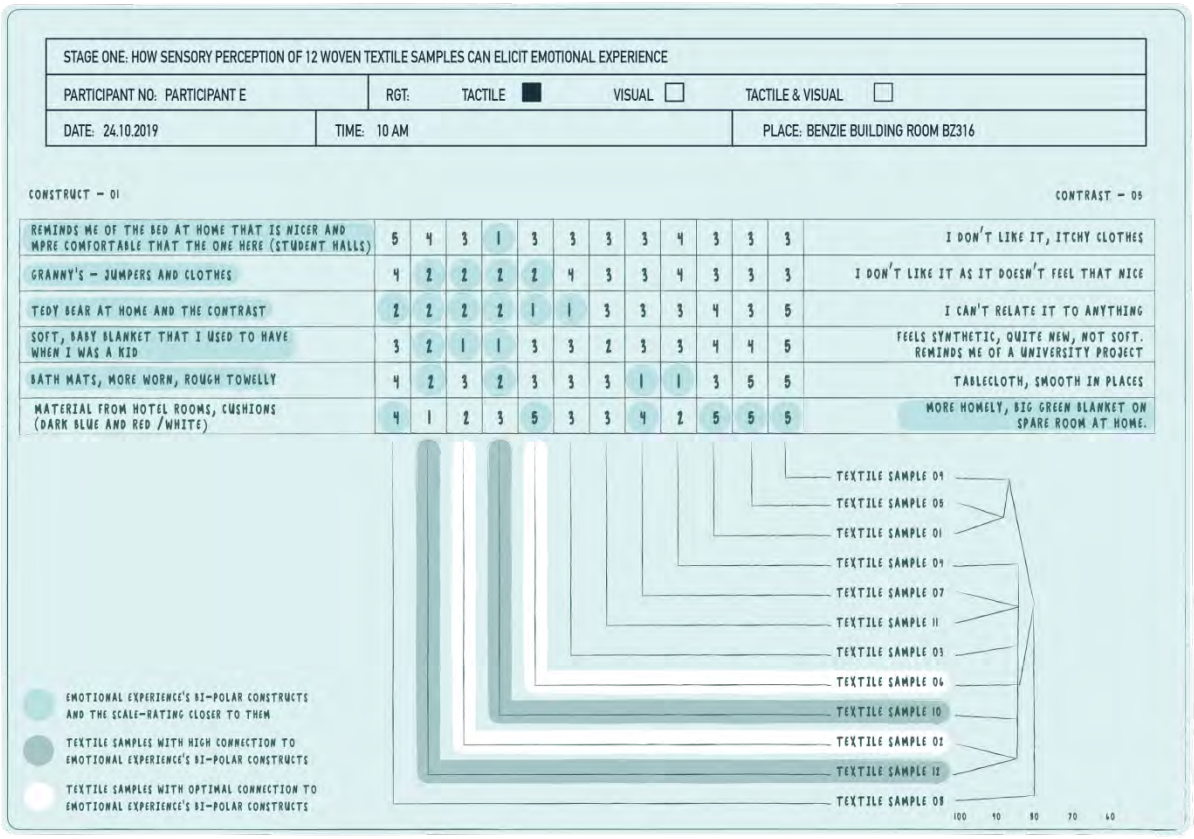


Table 7. 31. Participant E - tactile unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT E	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 31.10.2019	TIME: 10 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
reminds me of mum's scarf and wedding dress outfit texture	1	5	2	3	3	3	3	4	3	5	4	3	reminds me of a carpet
reminds me of old bio teacher- pattern colourful (bags and scarves)	5	3	3	5	5	2	1	4	4	3	3	2	wedding hat material (looks like)
reminds me of my mum's wedding dress (pattern in material)	5	3	3	5	5	2	1	5	2	3	3	1	reusable shopping bag, mum has it
tights textures to ones I own (see thorugh)	1	4	4	3	3	1	2	4	3	2	3	3	don't have a connection
reminds me of old bio teacher - scarves, bags and tops - patterned colourful texture	3	5	5	5	3	3	2	3	3	3	5	1	reminds me of boring scarves
parents duvet cover - textured and raised	5	3	3	4	4	1	2	4	2	3	3	1	reminds me of textile print material from university

Table 7. 32. Participant E - visual unimodal analysis RGT sheet.

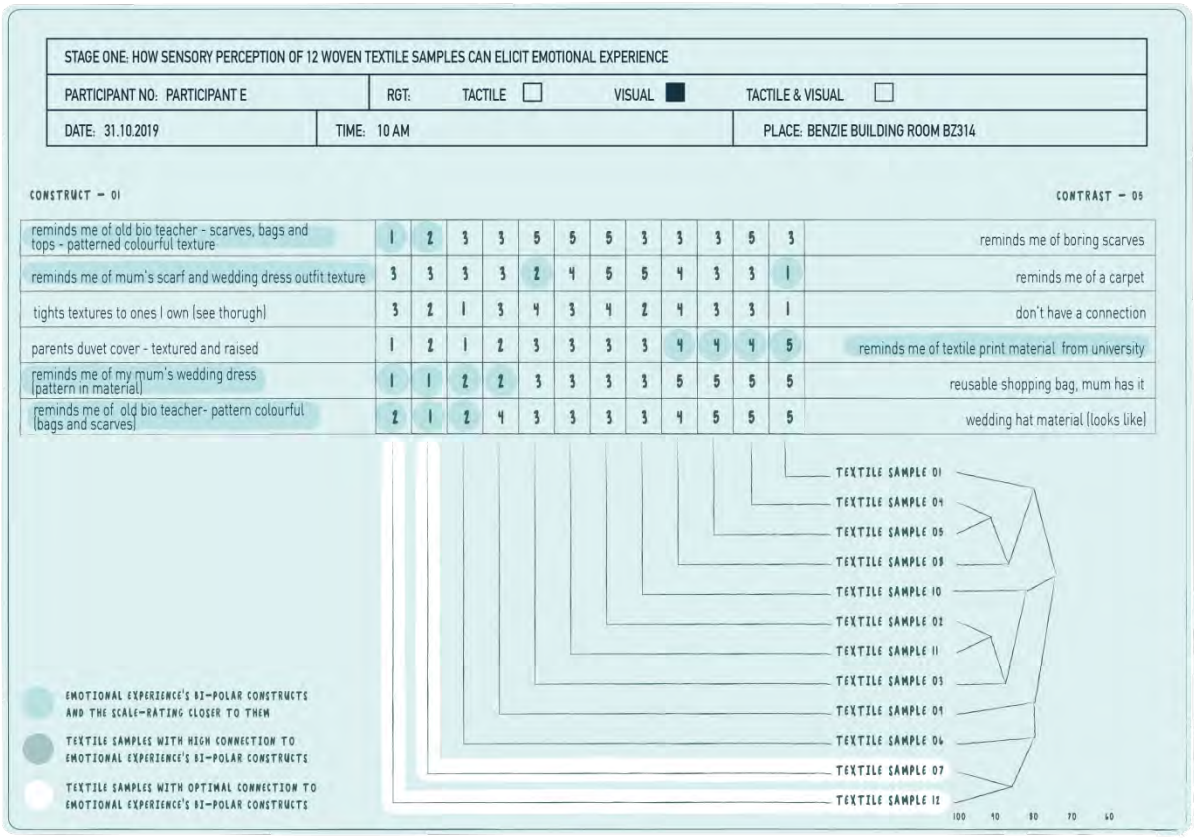


Table 7. 33. Participant E - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT E | RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■

DATE: 07.11.2019 | TIME: 10 AM | PLACE: BENZIE BUILDING ROOM BZ316

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
Jeans, one that broke and one that I've had it for years	5	4	4	3	2	3	3	3	5	5	5	4	it's really soft and nice, it reminds me of home
blue blanket, rough and smooth - very comfortable	5	2	2	2	4	2	2	3	4	2	3	2	pillows on conservatory chairs
blue blanket	4	3	3	2	1	4	2	3	2	3	3	3	hotel curtains soft and nice
scarves that my mum has, reminds me of her	2	1	1	4	3	3	3	3	1	1	1	4	rouched top for everyday, it's black
granny and grandad sofa texture and pattern. It was green	3	3	3	2	4	4	2	5	3	3	3	1	reusable shopping bag
sheep pillow I made when I was younger	5	1	1	3	3	3	3	3	2	1	1	3	dressing up dress

Table 7. 34. Participant E - tactile-visual bimodal analysis RGT sheet.

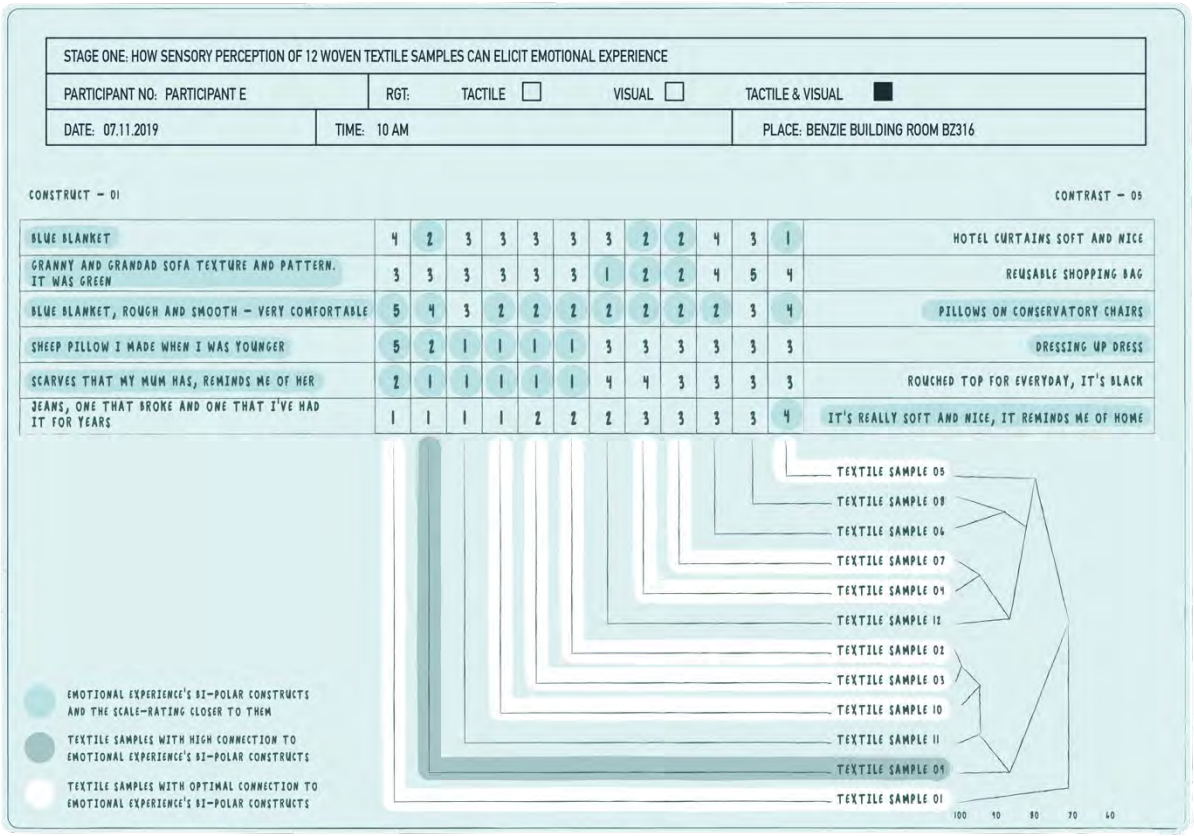


Table 7. 35. Participant E - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

Participant F

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT F | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 23.10.2019 | TIME: 10:45 AM | PLACE: BENZIE BUILDING ROOM BZ316

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
These are more interesting. When I was a child I used to wear woollen skirts	5	2	2	3	4	2	2	2	4	1	4	1	lighter, nicer to touch. Something that I problably choose. Reminds me of a dress thatit was made for a wedding of a friend.
I like these two more, The texture is smoother. I enjoy touching these	1	4	2	5	2	3	1	5	1	4	2	4	based on the roughness of the material
thicker with more texture, when I went to choose material for my room and I had to feel lots of different materials	4	3	2	1	4	1	1	3	4	2	4	2	my mum's tablecloth, she likes white tablecloth
fashion winter material	5	1	1	2	4	1	3	3	5	1	5	1	hardly any texture
thicker, when scratching it feels fuller	3	2	2	1	4	2	1	4	5	2	2	2	a little bit cheaper
they are boring and I don't like the feeling that much	5	3	3	2	4	4	4	1	5	4	1	3	smoothnesss and more comfortable

Table 7. 36. Participant F - tactile unimodal analysis RGT sheet.

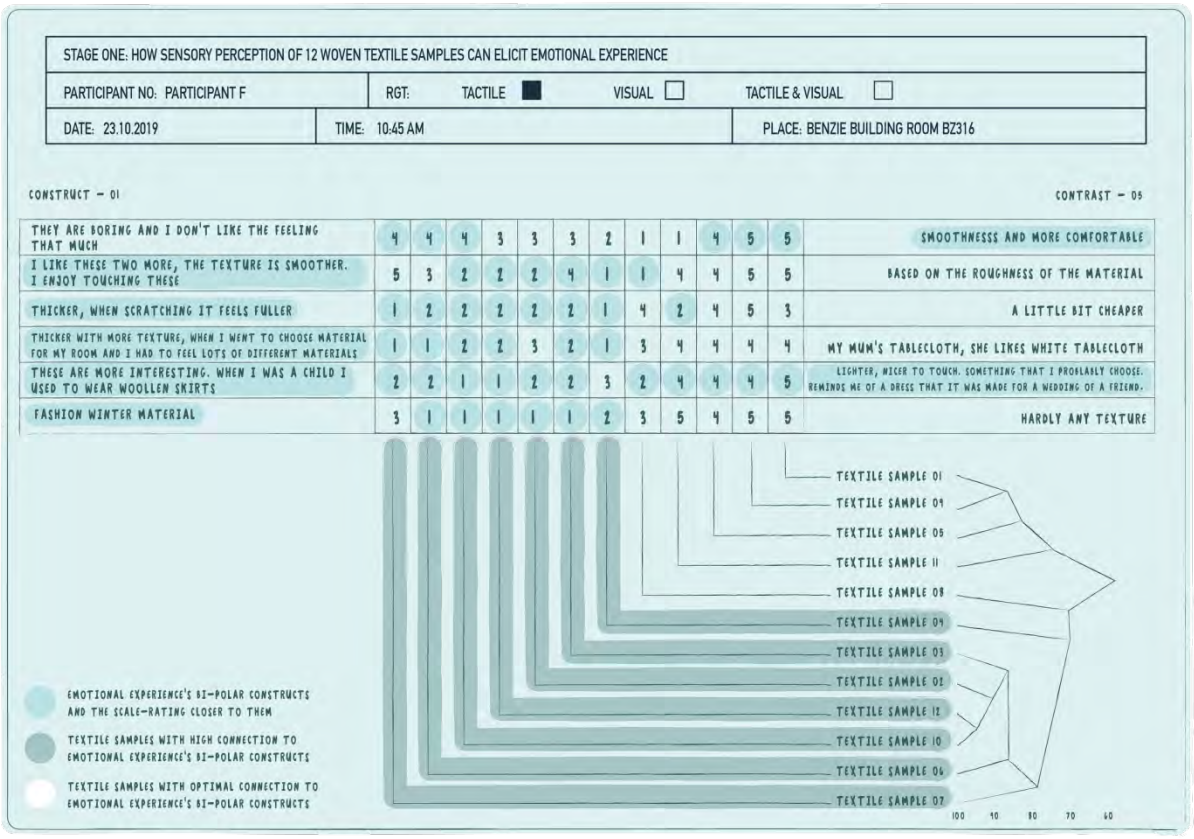


Table 7. 37. Participant F - tactile unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT F | RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐

DATE: 30.10.2019 | TIME: 10 AM | PLACE: BENZIE BUILDING ROOM BZ316

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
old person's carpet	5	2	2	1	4	3	3	3	2	3	3	1	smooth and elegant
old fashioned	3	3	3	2	4	3	2	4	1	5	5	1	contemporary
table cloth design and material	2	5	5	4	2	4	1	5	1	5	5	2	no connection
used for modern interior design	1	2	2	4	2	3	4	2	5	2	2	3	no connection - similar to sample 4
old house run down	3	4	3	3	3	3	3	3	3	3	3	2	coarse - looks rough
nice sheen to material	1	5	5	5	2	2	1	5	2	5	3	4	matt colouring

Table 7. 38. Participant F - visual unimodal analysis RGT sheet.

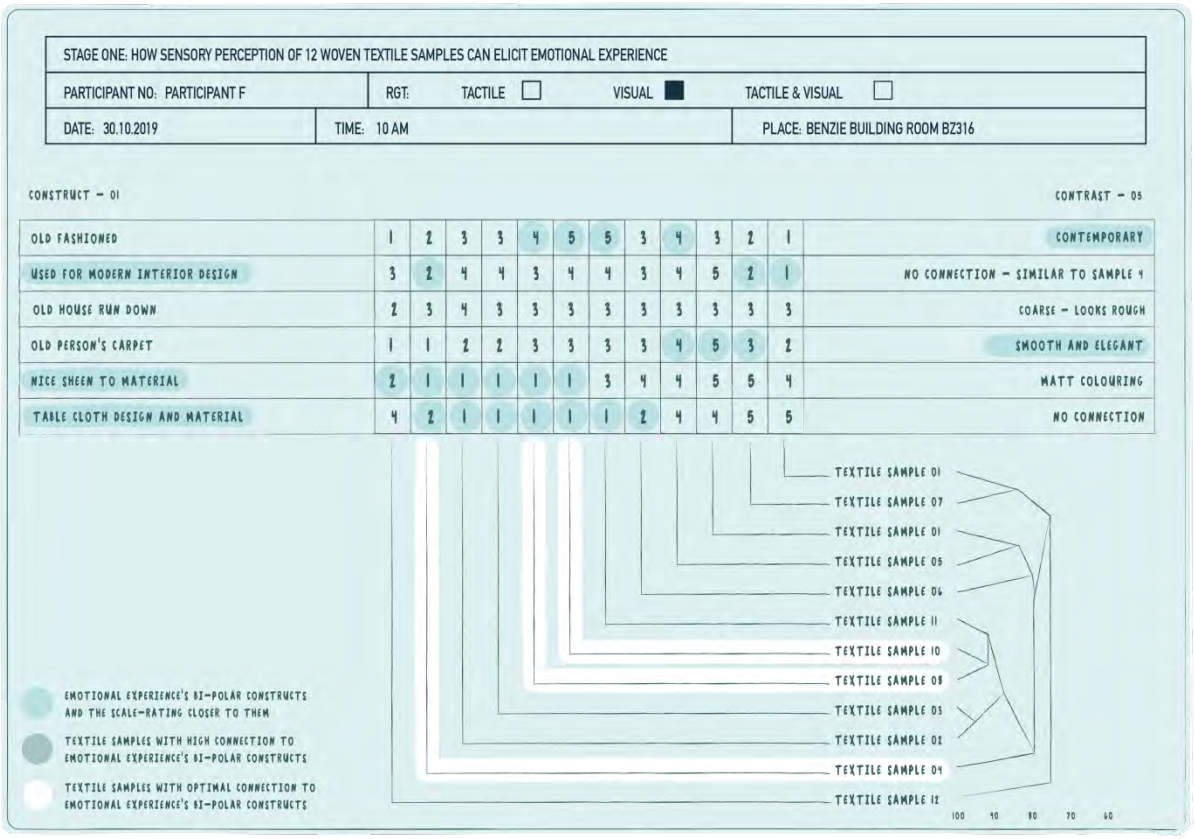


Table 7. 39. Participant F - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT F | RGT: | TACTILE ☐ | VISUAL ☐ | TACTILE & VISUAL ■

DATE: 13.11.2019 | TIME: 10:45 AM | PLACE: BENZIE BUILDING ROOM BZ316

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
winter fashion material	5	1	1	2	4	3	4	3	5	1	3	4	smooth and nice material
similar texture	3	4	4	5	2	2	2	3	2	3	1	3	thick and coarse
pattern and texture like tablecloth	2	4	4	4	2	3	1	5	1	4	4	2	horse like
thick and people wound use as anything	4	3	4	3	4	2	2	3	3	2	3	3	jumper like material and comfortable
used for clothing	3	3	2	3	3	4	5	3	5	3	3	4	used for interior
playful	4	2	2	1	4	1	3	3	4	1	5	1	simple

Table 7. 40. Participant F - tactile-visual bimodal analysis RGT sheet.

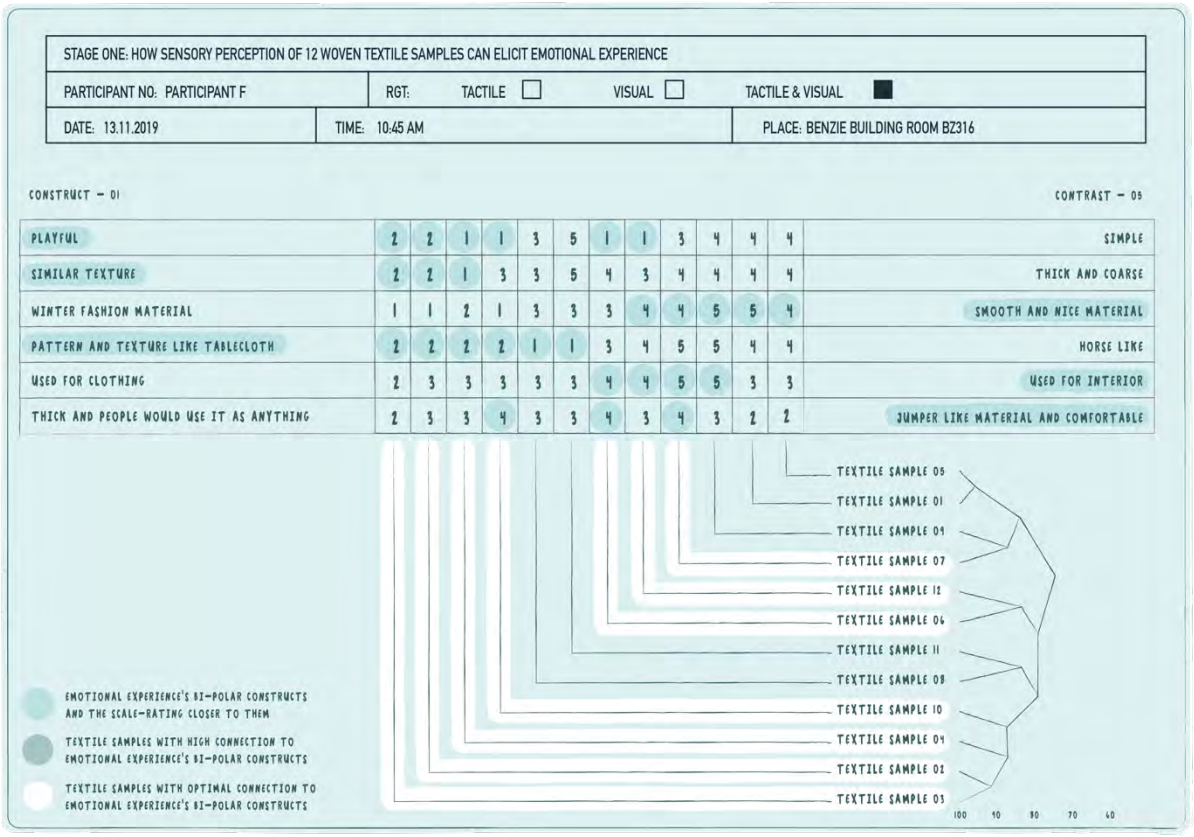


Table 7. 41. Participant F - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

Participant G

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT G | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 25.10.2019 | TIME: 11 AM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
familiar to me	1	1	1	2	1	1	1	4	1	1	1	1	I don't recognise it in any context. I don't feel related to it
common place	3	3	3	2	5	5	1	3	3	2	5	1	different texture in each side
they feel clothing. I'd wear them. More fluid	4	3	2	5	4	3	4	4	2	4	3	5	stiff - not comfortable
feel niver and cozy. Comforting	4	2	1	5	4	3	4	3	2	4	1	5	it's too much - my dad used to dress me with stiffer materials
I don't like them that much, roughless	5	4	3	1	2	4	2	5	4	2	3	2	a party shinny classy dress, wearing it. Nice ecperience
pink cord tousers. Really soft - never fit me well - old but something that I like	2	2	2	5	3	2	4	3	2	1	2	5	old lady colours - dark green/mustard. Not related to it

Table 7. 42. Participant G - tactile unimodal analysis RGT sheet.

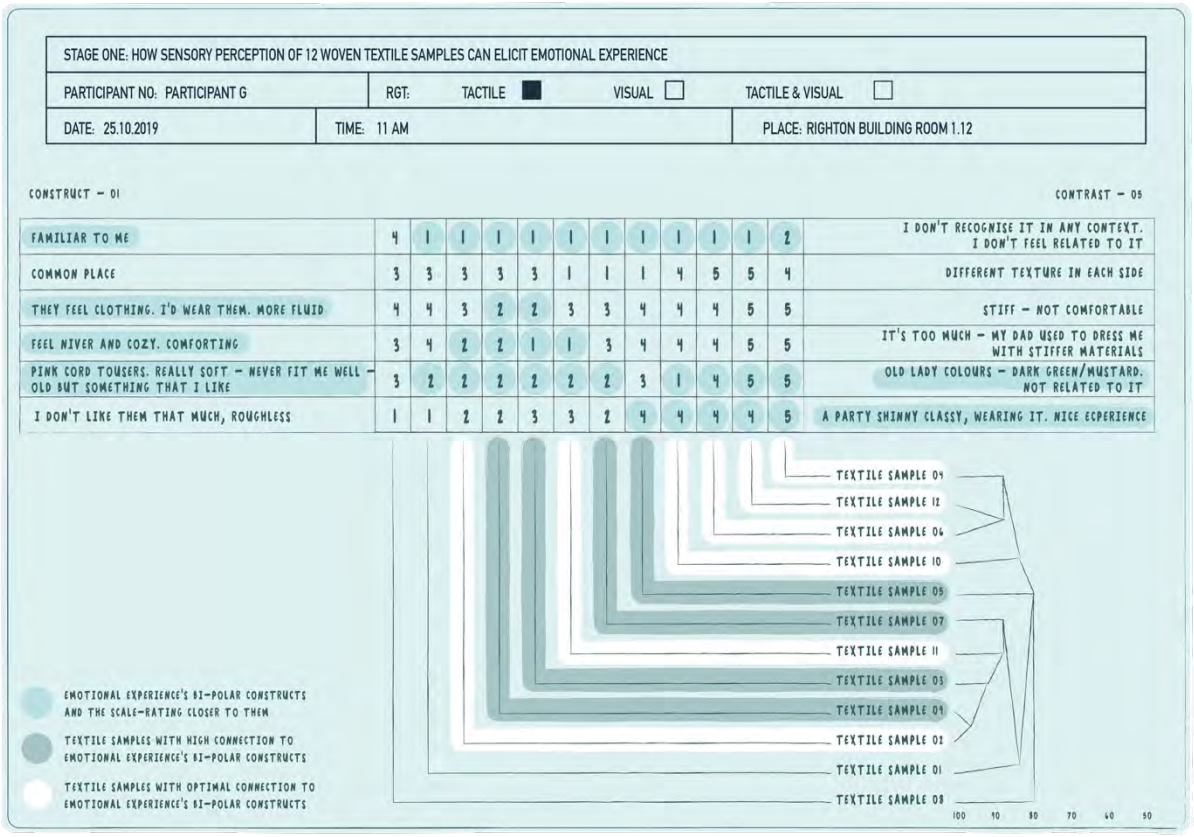


Table 7. 43. Participant G - tactile unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT G | RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐

DATE: 01.11.2019 | TIME: 09:30 AM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
made some winter furnishings	4	1	4	3	3	5	2	3	4	1	3	2	silky festive party
texture, colour, fine	2	5	3	3	3	3	3	3	2	5	2	2	thick, farmhouse, heavy
fancy, expensive	2	3	2	2	3	1	2	5	2	2	1	2	hessian shopping bag. ordinary
beautiful	1	4	2	2	3	1	2	3	2	5	1	2	ordinary, thick nomadic rug
regal	2	4	3	5	3	2	5	3	3	5	1	2	soft, expensive, home furnishing
thick winter warmers	5	1	2	2	3	2	2	5	3	1	3	2	summer picnic, practical and thin

Table 7. 44. Participant G - visual unimodal analysis RGT sheet.

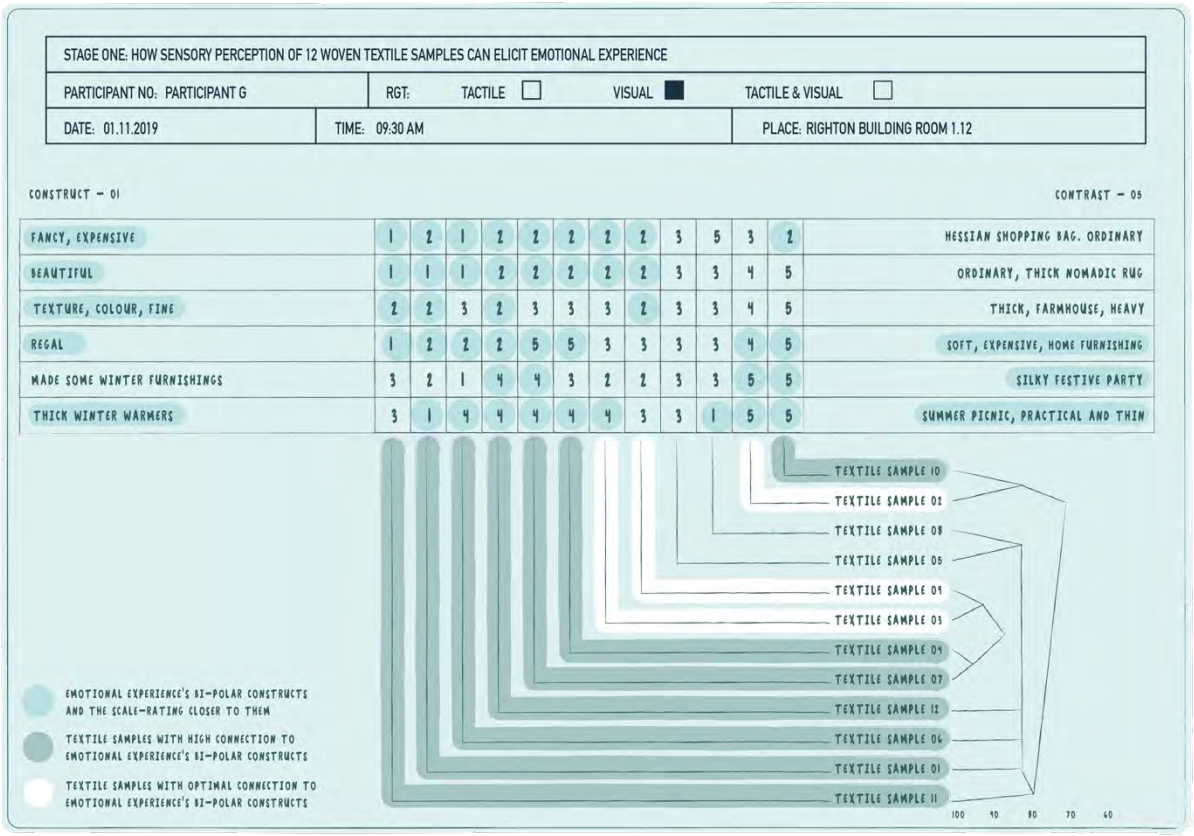


Table 7. 45. Participant G - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT G | RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■

DATE: 08.11.2019 | TIME: 10:45 AM | PLACE: BENZIE BUILDING ROOM BZ316

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
expensive and cosy	1	4	4	3	2	2	2	5	3	1	1	2	common place
rigid and uncomfortable	4	3	4	1	2	4	3	1	3	5	4	4	soft and beautiful
Christmas party	1	3	3	3	4	1	3	5	3	3	5	1	summer picnic
finer , more precious	1	5	4	3	3	1	1	3	3	5	1	1	soft and homely
morning and granny	4	2	3	3	3	5	5	3	3	3	4	3	evening and granny
expensive, fine, female, clingy	1	5	4	3	3	1	4	3	3	4	5	3	good quality, winter, males, scarf

Table 7. 46. Participant G - tactile-visual bimodal analysis RGT sheet.

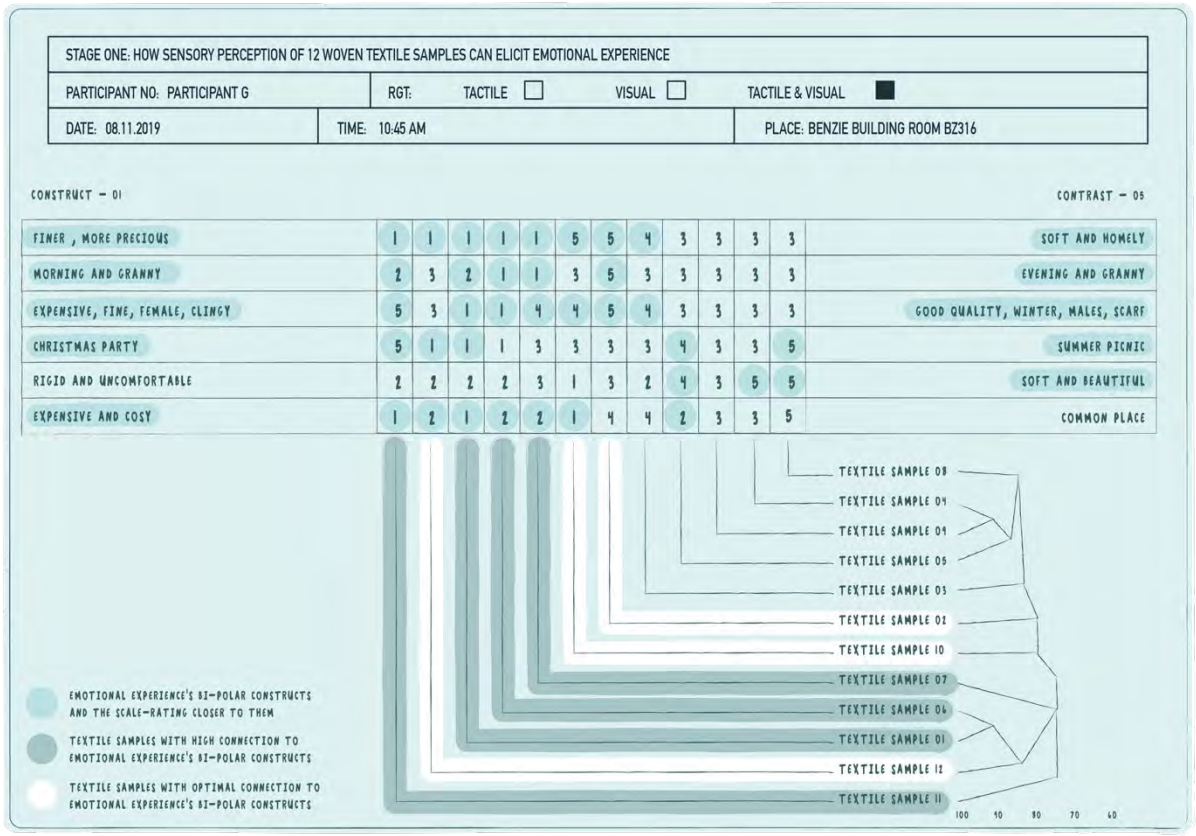


Table 7. 47. Participant G - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

Participant H

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT H | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 22.11.2019 | TIME: 08:50 AM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
feel similar -texture wise. It feels like the sofa	5	2	2	1	4	3	3	3	5	2	2	4	cushion on top of the sofa
I'd rather lay on them, touching my skin	1	4	4	5	2	2	2	5	1	4	4	4	texture and experience of a rug from my mum's house. I wouldn't lay on it
based on the fact that I'd actually wear them	2	5	4	5	1	2	2	5	1	5	5	5	trousers that I bought, I didn't like them and sent them back
they feel similar, they should be together. Positive and negative as you don't want to much of the same thing, too boring	4	2	3	4	1	4	4	4	1	4	4	5	I would remove the mistress, not because she doesn't belong there
I don't like the scratchiness of it. Negative feeling on my skin	5	1	2	1	5	5	4	1	5	1	2	2	feels softer, I'd have it on my skin
feels nice in one side. Cushions that mum got, green ones, mixed textures. It feels like that. Square cushion	1	3	4	5	2	1	2	5	1	4	4	5	feels scratchy. Rug. Furniture from my mum's house new and old

Table 7. 48. Participant H - tactile unimodal analysis RGT sheet.

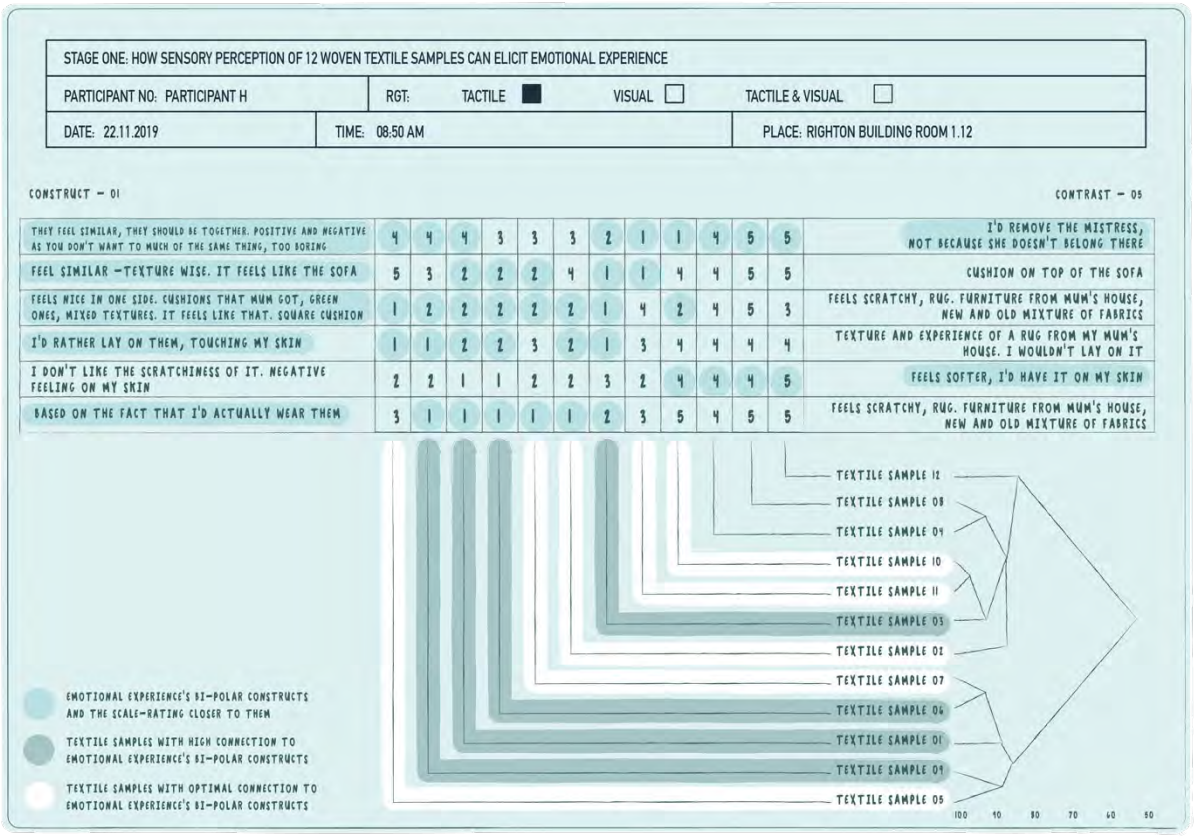


Table 7. 49. Participant H - tactile unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE

PARTICIPANT NO: PARTICIPANT H | RGT: | TACTILE ☐ | VISUAL ■ | TACTILE & VISUAL ☐

DATE: 29.11.2019 | TIME: 08:50 AM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
lieing, look to side	5	1	1	3	5	3	3	5	3	3	4	3	old, flat, truth
layers, hidden, not transparent	5	2	5	2	5	5	4	5	5	2	3	5	transparent, same both sides, no layers
redjimented, structed, square	3	2	2	1	5	2	1	5	1	2	4	1	faker, loose, free
not lost, clear, transparent, structure, obvious	4	1	2	1	3	1	1	4	1	1	4	1	expensive, lost, not obvious, can be independent
independent, separate, can be alone	4	1	1	2	4	1	1	5	1	1	4	1	relient on other two
loose, more movement, textured. There is more of a conversation within the matiral in it's parts	4	2	2	2	5	1	1	5	3	1	4	1	tight, strached, flat, not much conversation going on

Table 7. 50. Participant H - visual unimodal analysis RGT sheet.

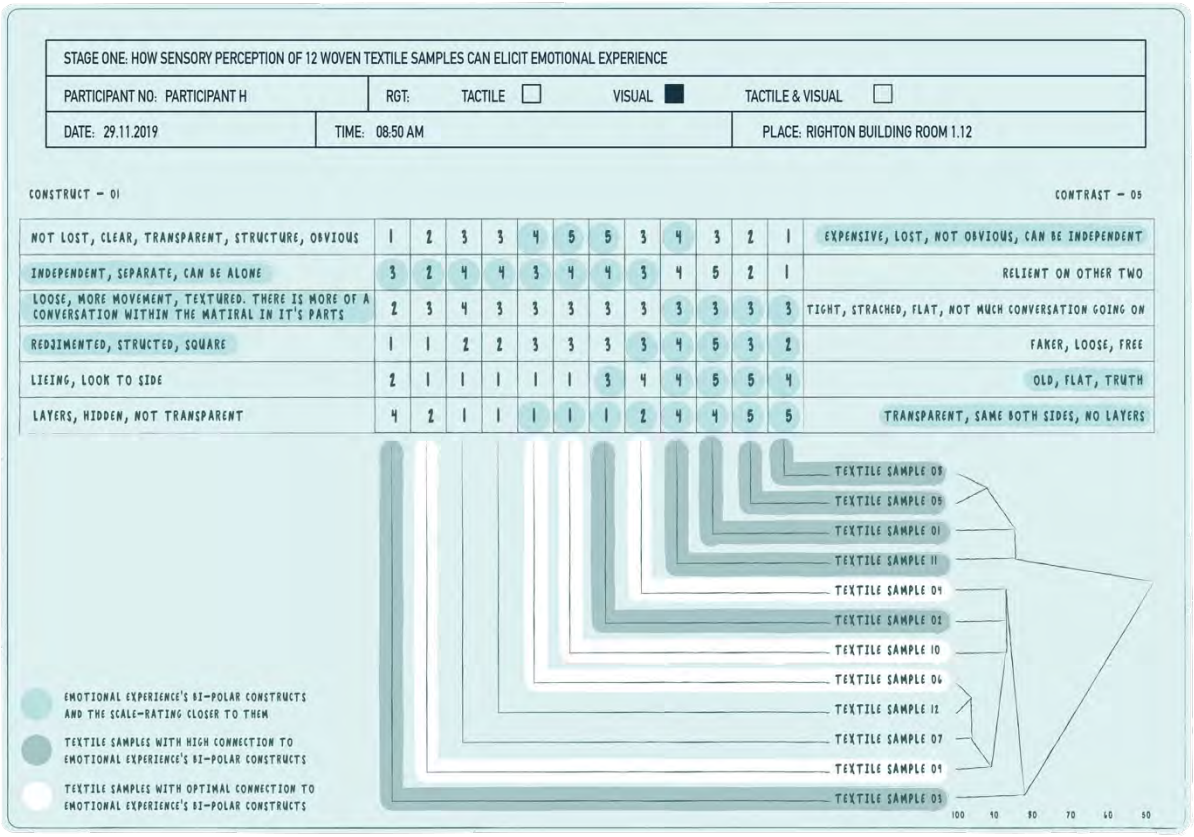


Table 7. 51. Participant H - visual unimodal analysis RGT sheet focus cluster analysis.

STAGE ONE: HOW SENSORY PERCEPTION OF 12 WOVEN TEXTILE SAMPLES CAN ELICIT EMOTIONAL EXPERIENCE		
PARTICIPANT NO: PARTICIPANT H	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 06.12.2019	TIME: 08:50 AM	PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	TEXTILE SAMPLE 05	TEXTILE SAMPLE 06	TEXTILE SAMPLE 07	TEXTILE SAMPLE 08	TEXTILE SAMPLE 09	TEXTILE SAMPLE 10	TEXTILE SAMPLE 11	TEXTILE SAMPLE 12	CONTRAST - 05
similarity in surface, the back is the same	4	1	1	1	1	1	1	1	1	5	5	5	different, different back
look different, feel the same, not expected	2	2	2	2	3	3	5	3	3	1	1	3	looks the same, feels different
structed, square, soft	3	2	2	1	5	2	1	5	1	2	3	1	scracthy, flat, boring
movement, interaction, feedback	5	2	2	1	5	1	2	5	5	1	5	1	not movement, not feedback, more 'one level'
repreated, same, boring	2	3	4	1	1	4	1	1	1	4	3	4	unexpected, hidden, reveal
addictive, feedback, interaction from fabric	5	2	2	1	5	5	1	5	5	1	5	1	flat, not feedback, no fabric interaction

Table 7. 52. Participant H - tactile-visual bimodal analysis RGT sheet analysis.

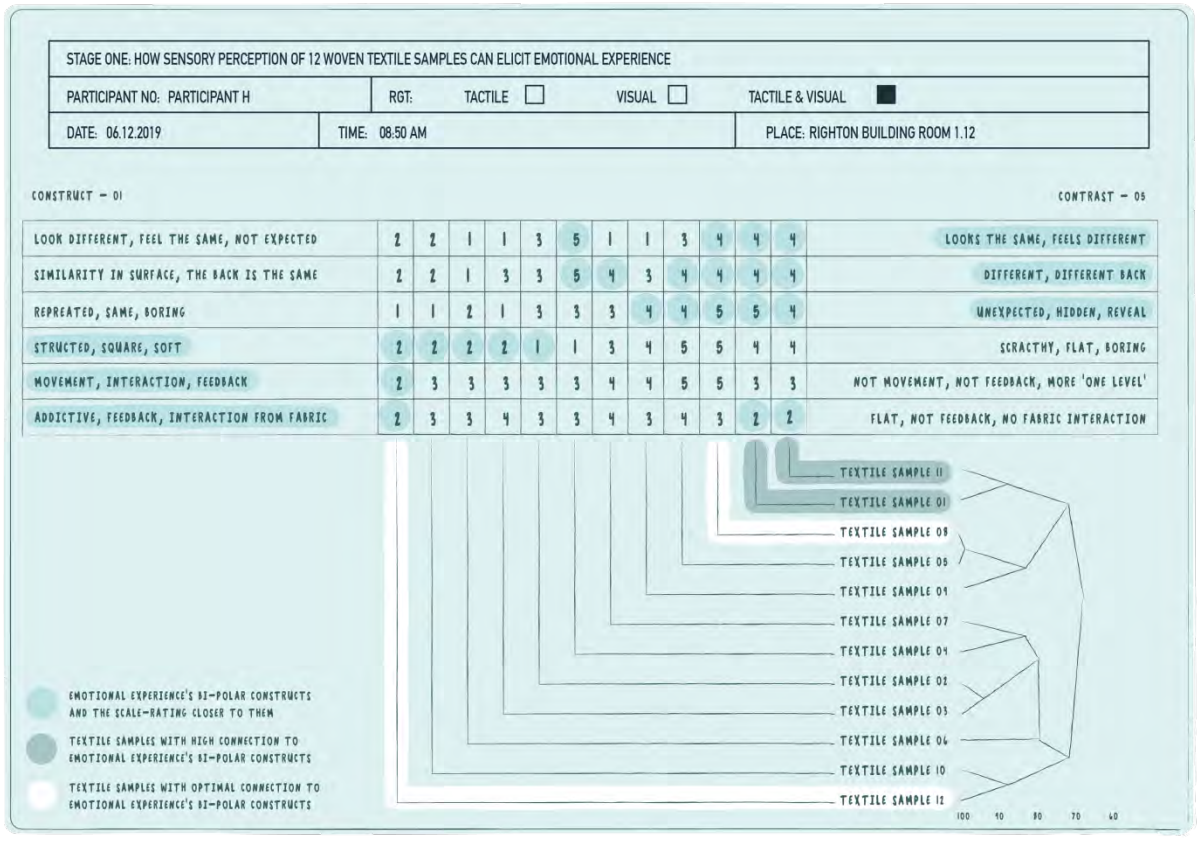


Table 7. 53. Participant H - tactile-visual bimodal analysis RGT sheet focus cluster analysis.

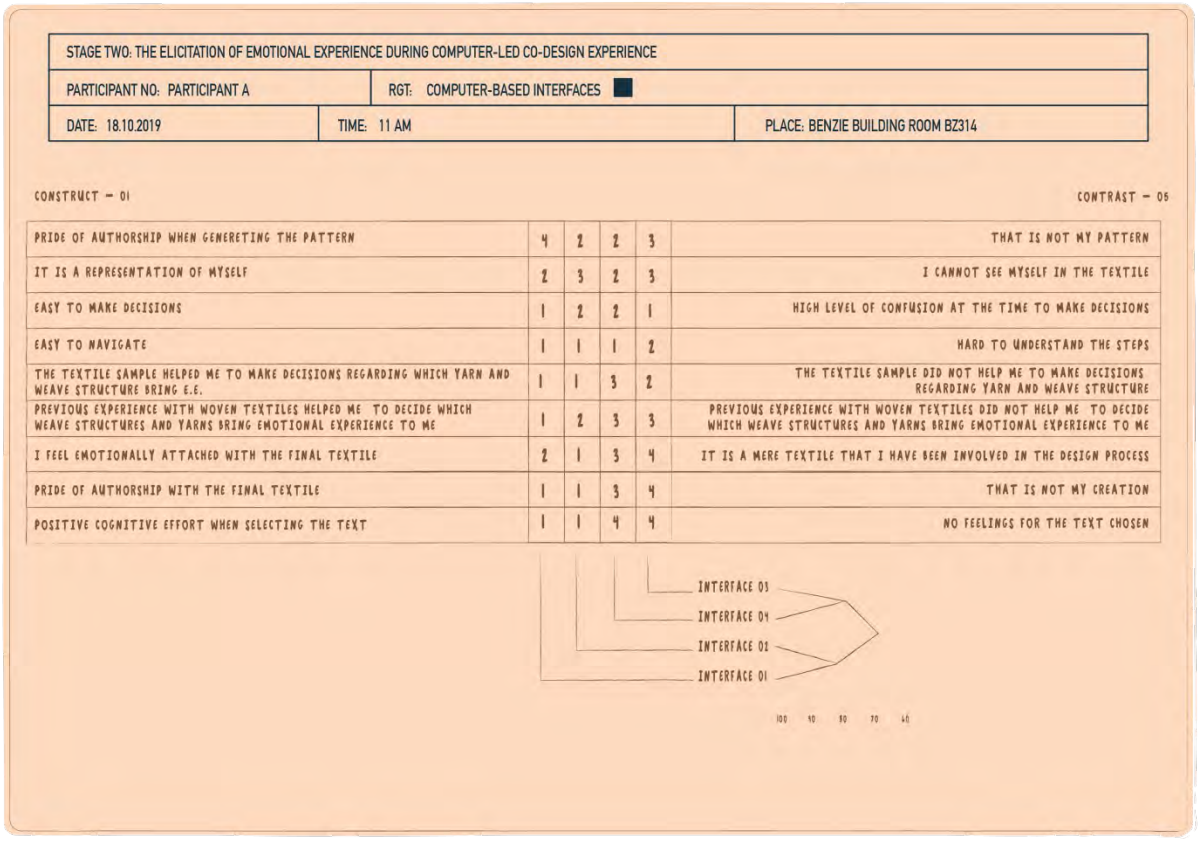
7.6. APPENDIX F: STAGE TWO REPERTORY GRID TECHNIQUE INTERVIEWS

Participant A

STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE		
PARTICIPANT NO: PARTICIPANT A	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 18.10.2019	TIME: 11 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	1	1	4	4	no feelings for the text chosen
pride of authorship when genereting the pattern	4	2	3	2	that is not my pattern
easy to make decisions	1	2	1	2	high level of confusion at the time to make decisions
it is a representation of myself	2	3	3	2	I cannot see myself in the textile
easy to navigate	1	1	2	2	hard to understand the steps
I feel emotionally attached with the final textile	2	1	4	3	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	1	2	3	3	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	1	1	4	3	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	1	1	3	2	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 54. Participant A – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE		
PARTICIPANT NO: PARTICIPANT A	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 18.10.2019	TIME: 11 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT – 01					CONTRAST – 05
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	4	2	2	3	THAT IS NOT MY PATTERN
IT IS A REPRESENTATION OF MYSELF	2	3	2	3	I CANNOT SEE MYSELF IN THE TEXTILE
EASY TO MAKE DECISIONS	1	2	2	1	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS
EASY TO NAVIGATE	1	1	1	2	HARD TO UNDERSTAND THE STEPS
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	1	1	3	2	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	1	2	3	3	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	2	1	3	4	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	1	1	3	4	THAT IS NOT MY CREATION
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	1	1	4	4	NO FEELINGS FOR THE TEXT CHOSEN

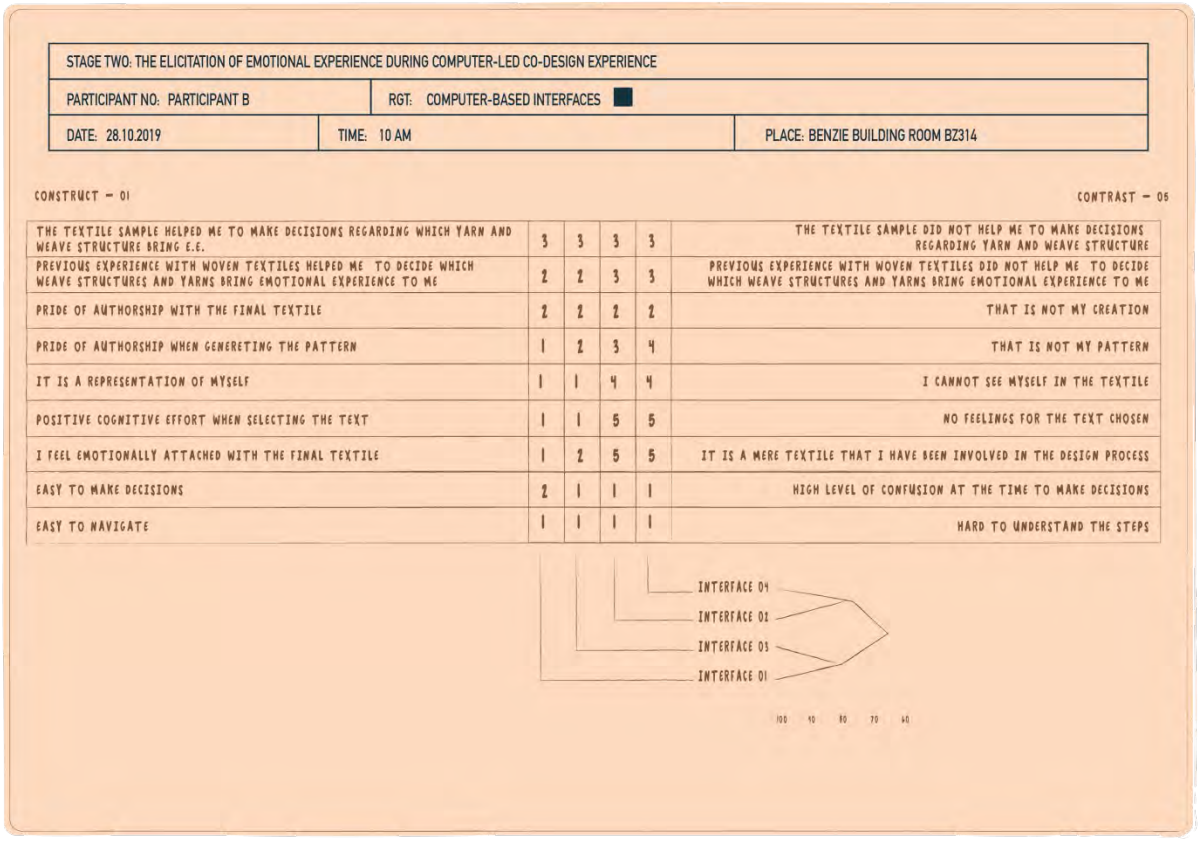
Table 7. 55. Participant A – computer-based interfaces analysis RGT sheet focus cluster analysis.

Participant B

STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE		
PARTICIPANT NO: PARTICIPANT B	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 28.10.2019	TIME: 10 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	1	5	1	5	no feelings for the text chosen
pride of authorship when genereting the pattern	1	3	2	4	that is not my pattern
easy to make decisions	2	1	1	1	high level of confusion at the time to make decisions
it is a representation of myself	1	4	1	4	I cannot see myself in the textile
easy to navigate	1	1	1	1	hard to understand the steps
I feel emotionally attached with the final textile	1	5	2	5	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	2	3	2	3	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	2	2	2	2	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	3	3	3	3	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 56. Participant B – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT B | RGT: COMPUTER-BASED INTERFACES ■

DATE: 28.10.2019 | TIME: 10 AM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT – 01					CONTRAST – 05
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	3	3	3	3	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	2	2	3	3	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	2	2	2	2	THAT IS NOT MY CREATION
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	1	2	3	4	THAT IS NOT MY PATTERN
IT IS A REPRESENTATION OF MYSELF	1	1	4	4	I CANNOT SEE MYSELF IN THE TEXTILE
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	1	1	5	5	NO FEELINGS FOR THE TEXT CHOSEN
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	1	2	5	5	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS
EASY TO MAKE DECISIONS	2	1	1	1	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS
EASY TO NAVIGATE	1	1	1	1	HARD TO UNDERSTAND THE STEPS

Table 7. 57. Participant B – computer-based interfaces analysis RGT sheet focus cluster analysis.

Participant C

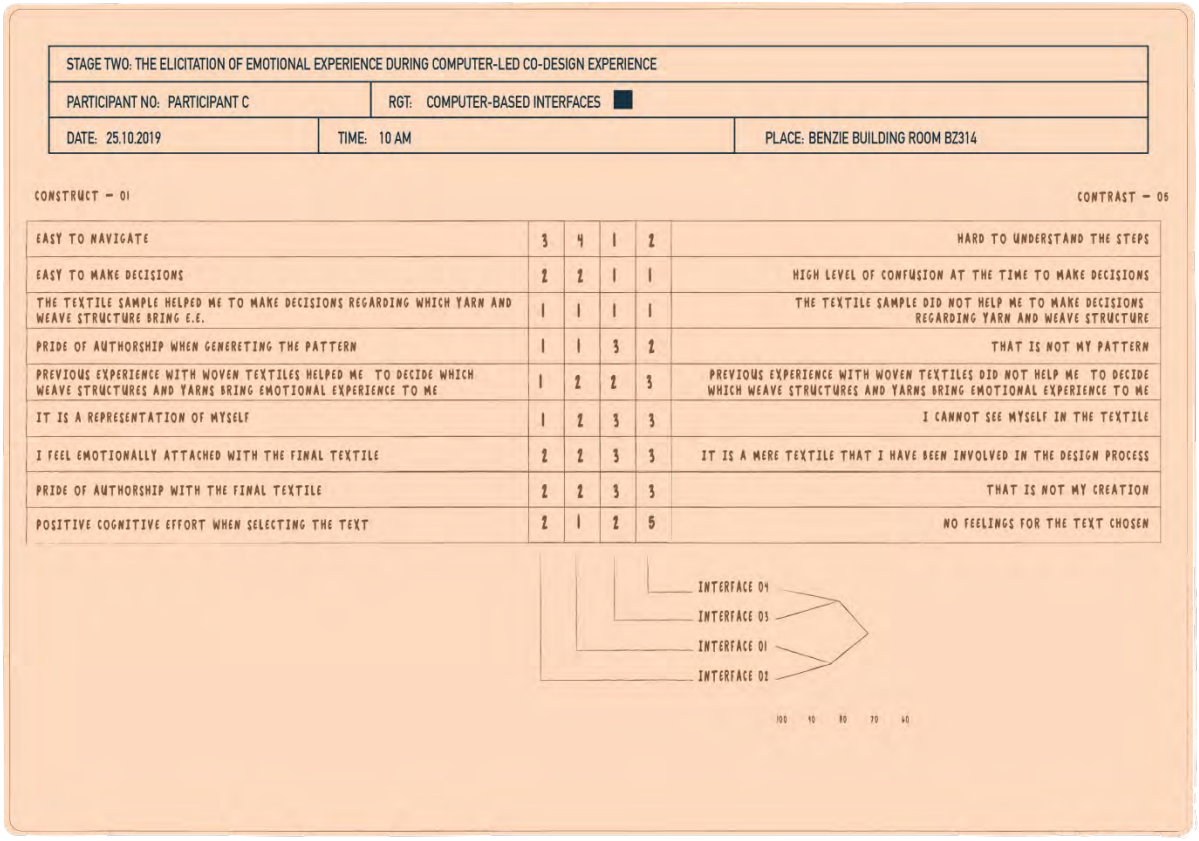
STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT C | RGT: COMPUTER-BASED INTERFACES ■

DATE: 25.10.2019 | TIME: 10 AM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	1	2	2	5	no feelings for the text chosen
pride of authorship when genereting the pattern	1	1	3	2	that is not my pattern
easy to make decisions	4	4	5	5	high level of confusion at the time to make decisions
it is a representation of myself	2	1	3	3	I cannot see myself in the textile
easy to navigate	2	3	5	4	hard to understand the steps
I feel emotionally attached with the final textile	2	2	3	3	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	2	1	2	3	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	2	2	3	3	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	1	1	1	1	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 58. Participant C – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT C | RGT: COMPUTER-BASED INTERFACES ■

DATE: 25.10.2019 | TIME: 10 AM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT – 01					CONTRAST – 05
EASY TO NAVIGATE	3	4	1	2	HARD TO UNDERSTAND THE STEPS
EASY TO MAKE DECISIONS	2	2	1	1	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	1	1	1	1	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	1	1	3	2	THAT IS NOT MY PATTERN
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	1	2	2	3	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
IT IS A REPRESENTATION OF MYSELF	1	2	3	3	I CANNOT SEE MYSELF IN THE TEXTILE
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	2	2	3	3	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	2	2	3	3	THAT IS NOT MY CREATION
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	2	1	2	5	NO FEELINGS FOR THE TEXT CHOSEN

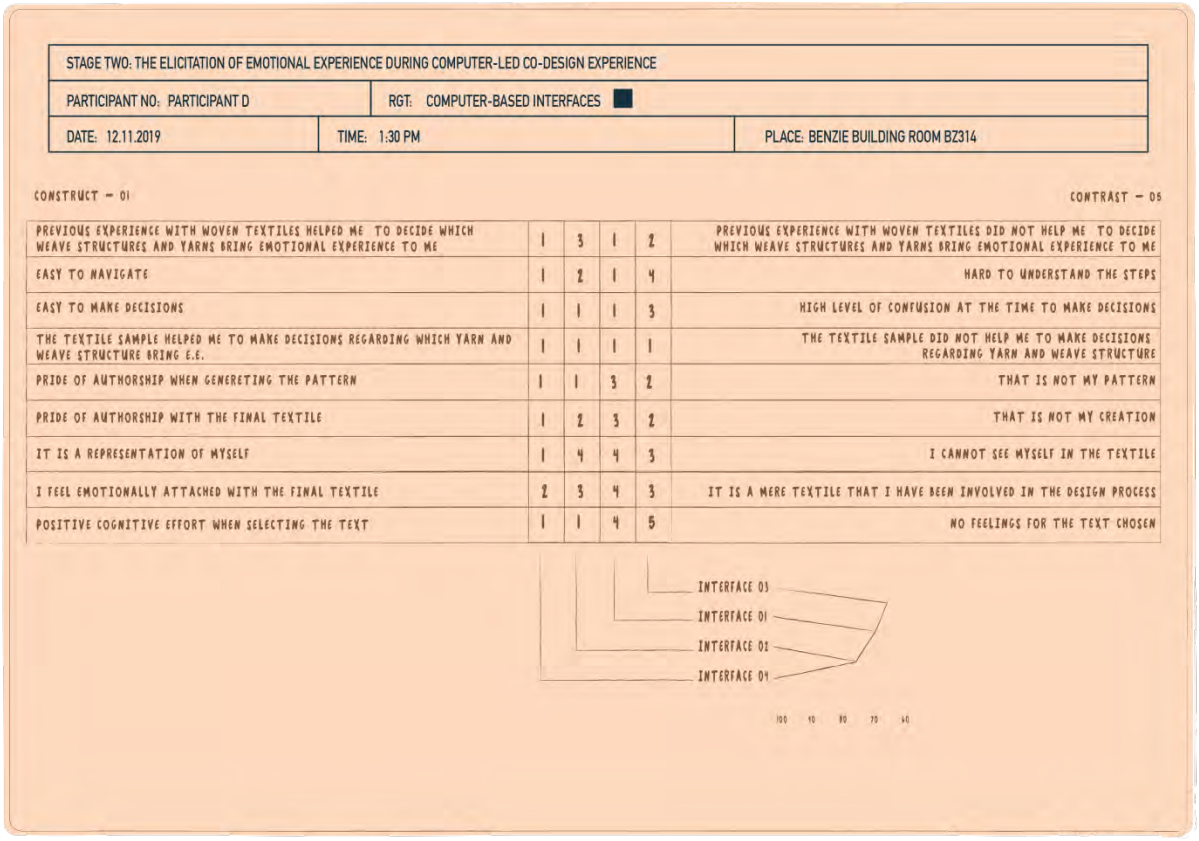
Table 7. 59. Participant C – computer-based interfaces analysis RGT sheet focus cluster analysis.

Participant D

STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE		
PARTICIPANT NO: PARTICIPANT D	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 12.11.2019	TIME: 1:30 PM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	2	5	1	5	no feelings for the text chosen
pride of authorship when genereting the pattern	3	1	2	1	that is not my pattern
easy to make decisions	1	1	3	1	high level of confusion at the time to make decisions
it is a representation of myself	4	4	3	1	I cannot see myself in the textile
easy to navigate	1	2	4	1	hard to understand the steps
I feel emotionally attached with the final textile	4	3	3	2	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	1	3	2	1	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	3	2	2	1	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	1	1	1	1	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 60. Participant D – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT D	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 12.11.2019	TIME: 1:30 PM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT – 01					CONTRAST – 05
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	1	3	1	2	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
EASY TO NAVIGATE	1	2	1	4	HARD TO UNDERSTAND THE STEPS
EASY TO MAKE DECISIONS	1	1	1	3	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	1	1	1	1	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	1	1	3	2	THAT IS NOT MY PATTERN
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	1	2	3	2	THAT IS NOT MY CREATION
IT IS A REPRESENTATION OF MYSELF	1	4	4	3	I CANNOT SEE MYSELF IN THE TEXTILE
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	2	3	4	3	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	1	1	4	5	NO FEELINGS FOR THE TEXT CHOSEN

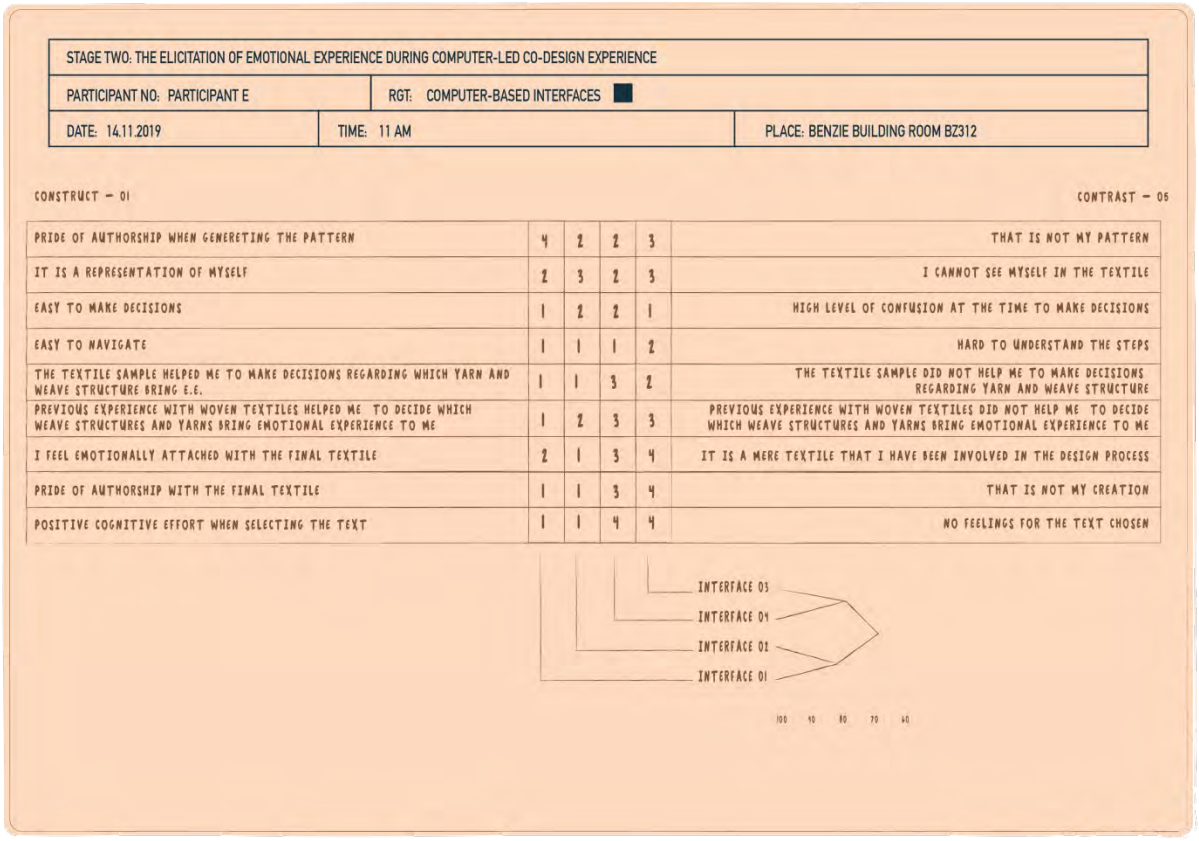
Table 7. 61. Participant D – computer-based interfaces analysis RGT sheet focus cluster analysis.

Participant E

STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE		
PARTICIPANT NO: PARTICIPANT E	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 14.11.2019	TIME: 11 AM	PLACE: BENZIE BUILDING ROOM BZ312

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	2	2	1	5	no feelings for the text chosen
pride of authorship when genereting the pattern	5	4	3	3	that is not my pattern
easy to make decisions	2	1	4	3	high level of confusion at the time to make decisions
it is a representation of myself	3	5	5	3	I cannot see myself in the textile
easy to navigate	2	2	4	4	hard to understand the steps
I feel emotionally attached with the final textile	4	4	3	5	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	3	4	3	3	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	4	4	5	2	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	1	2	1	2	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 62. Participant E – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT E	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 14.11.2019	TIME: 11 AM	PLACE: BENZIE BUILDING ROOM BZ312

CONSTRUCT – 01					CONTRAST – 05
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	4	2	2	3	THAT IS NOT MY PATTERN
IT IS A REPRESENTATION OF MYSELF	2	3	2	3	I CANNOT SEE MYSELF IN THE TEXTILE
EASY TO MAKE DECISIONS	1	2	2	1	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS
EASY TO NAVIGATE	1	1	1	2	HARD TO UNDERSTAND THE STEPS
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	1	1	3	2	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	1	2	3	3	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	2	1	3	4	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	1	1	3	4	THAT IS NOT MY CREATION
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	1	1	4	4	NO FEELINGS FOR THE TEXT CHOSEN

Table 7. 63. Participant E – computer-based interfaces analysis RGT sheet focus cluster analysis.

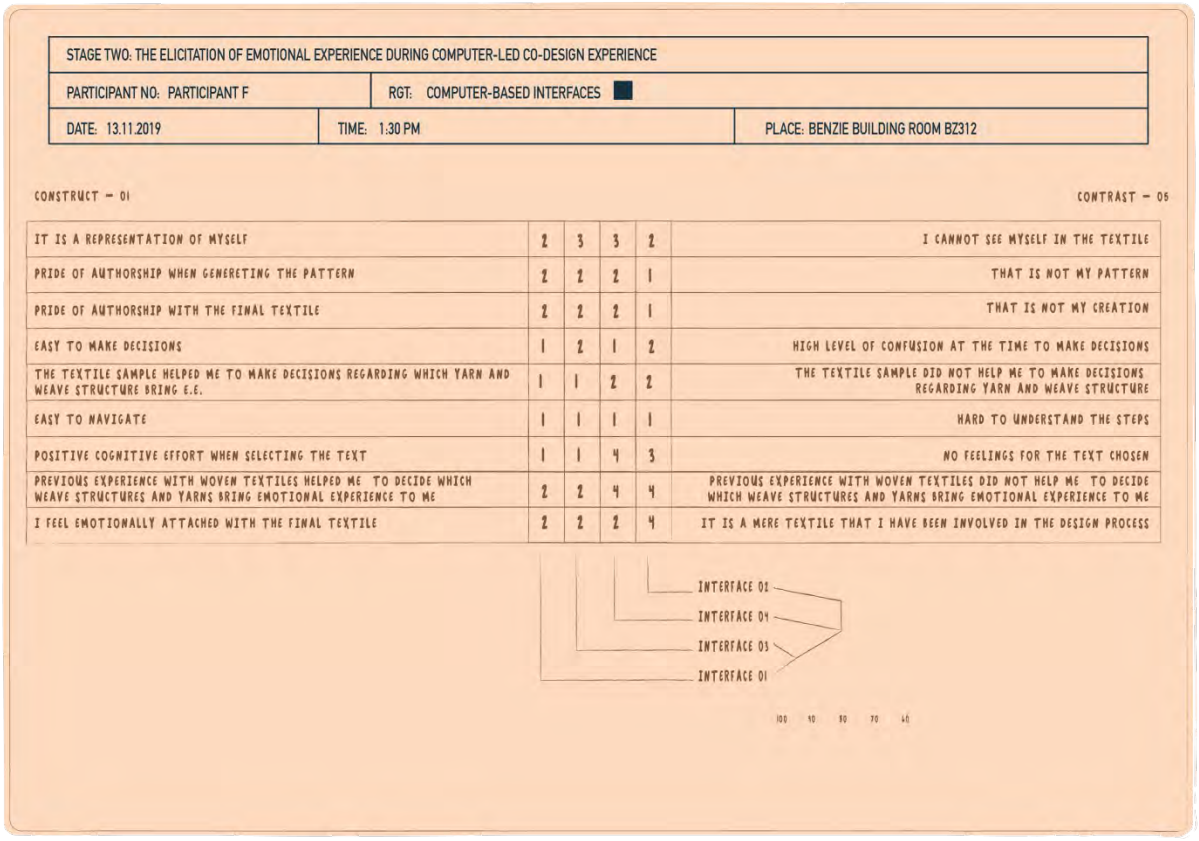
Participant F

STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT F	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 13.11.2019	TIME: 1:30 PM	PLACE: BENZIE BUILDING ROOM BZ312

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	1	3	1	4	no feelings for the text chosen
pride of authorship when genereting the pattern	2	1	2	2	that is not my pattern
easy to make decisions	1	2	2	1	high level of confusion at the time to make decisions
it is a representation of myself	2	2	3	3	I cannot see myself in the textile
easy to navigate	1	1	1	1	hard to understand the steps
I feel emotionally attached with the final textile	2	4	2	2	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	2	4	2	4	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	2	1	2	2	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	1	2	1	2	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 64. Participant F – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT F | RGT: COMPUTER-BASED INTERFACES

DATE: 13.11.2019 | TIME: 1:30 PM | PLACE: BENZIE BUILDING ROOM BZ312

CONSTRUCT – 01					CONTRAST – 05
IT IS A REPRESENTATION OF MYSELF	2	3	3	2	I CANNOT SEE MYSELF IN THE TEXTILE
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	2	2	2	1	THAT IS NOT MY PATTERN
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	2	2	2	1	THAT IS NOT MY CREATION
EASY TO MAKE DECISIONS	1	2	1	2	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	1	1	2	2	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
EASY TO NAVIGATE	1	1	1	1	HARD TO UNDERSTAND THE STEPS
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	1	1	4	3	NO FEELINGS FOR THE TEXT CHOSEN
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	2	2	4	4	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	2	2	2	4	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS

Table 7. 65. Participant F – computer-based interfaces analysis RGT sheet focus cluster analysis.

Participant G

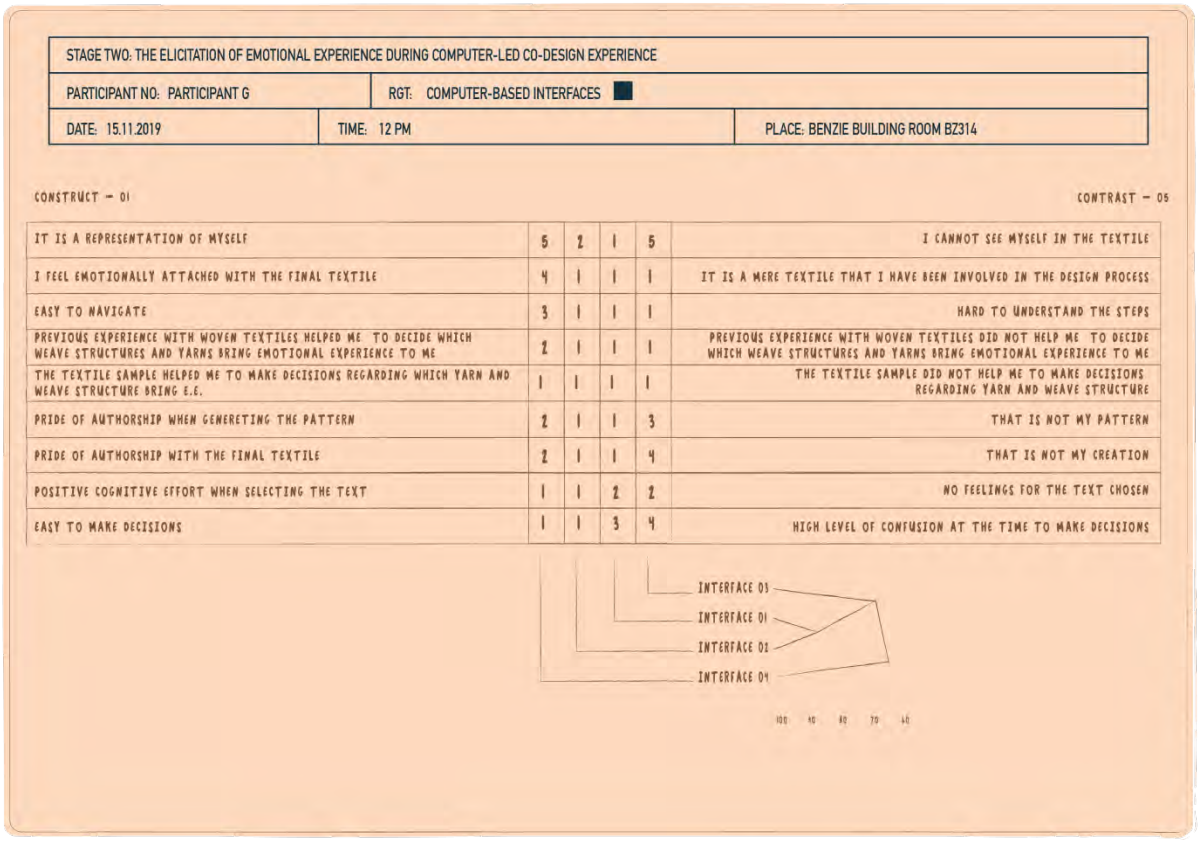
STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT G | RGT: COMPUTER-BASED INTERFACES ■

DATE: 15.11.2019 | TIME: 12 PM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	2	1	2	1	no feelings for the text chosen
pride of authorship when genereting the pattern	1	1	3	2	that is not my pattern
easy to make decisions	3	1	4	1	high level of confusion at the time to make decisions
it is a representation of myself	1	2	5	5	I cannot see myself in the textile
easy to navigate	1	1	1	3	hard to understand the steps
I feel emotionally attached with the final textile	1	1	1	4	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	1	1	1	2	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	1	1	4	2	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	1	1	1	1	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 66. Participant G – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT G | RGT: COMPUTER-BASED INTERFACES ■

DATE: 15.11.2019 | TIME: 12 PM | PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT – 01					CONTRAST – 05
IT IS A REPRESENTATION OF MYSELF	5	2	1	5	I CANNOT SEE MYSELF IN THE TEXTILE
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	4	1	1	1	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS
EASY TO NAVIGATE	3	1	1	1	HARD TO UNDERSTAND THE STEPS
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	2	1	1	1	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	1	1	1	1	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	2	1	1	3	THAT IS NOT MY PATTERN
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	2	1	1	4	THAT IS NOT MY CREATION
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	1	1	2	2	NO FEELINGS FOR THE TEXT CHOSEN
EASY TO MAKE DECISIONS	1	1	3	4	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS

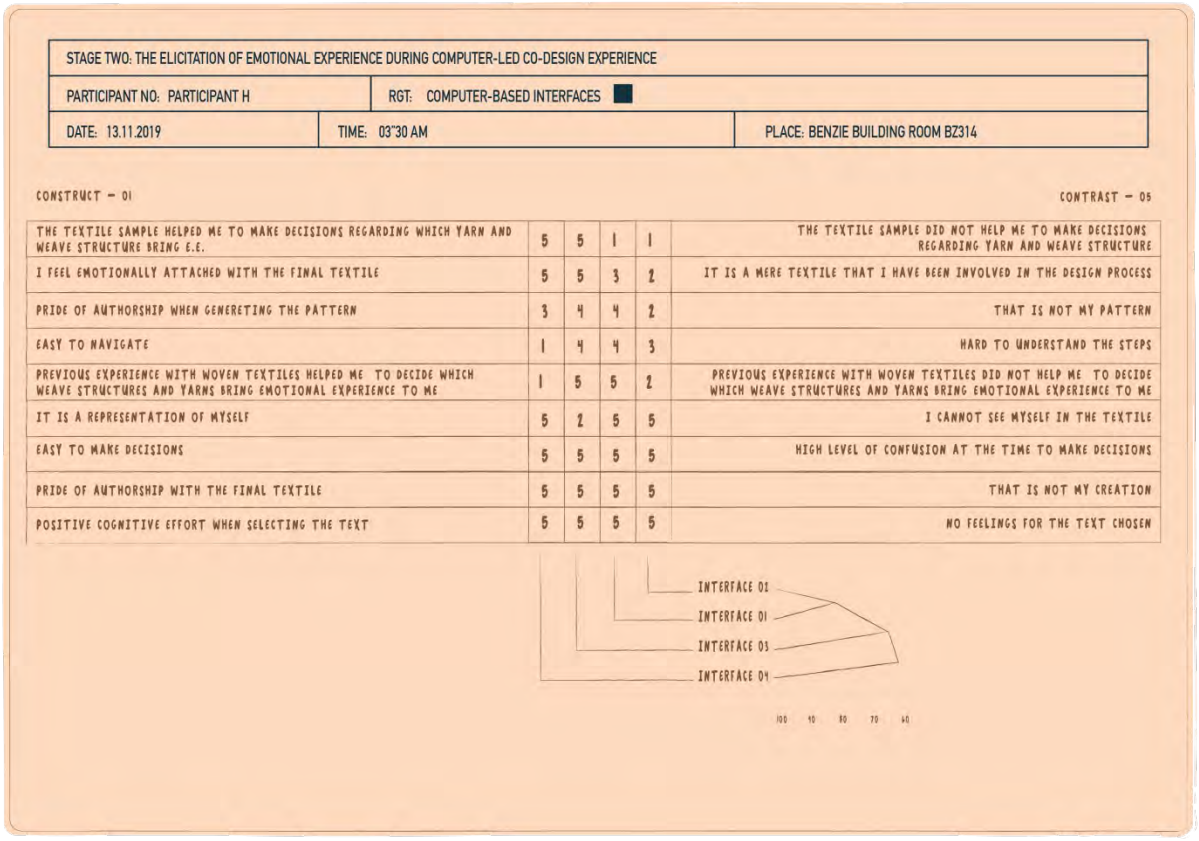
Table 7. 67. Participant G – computer-based interfaces analysis RGT sheet focus cluster analysis.

Participant H

STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE		
PARTICIPANT NO: PARTICIPANT H	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 13.11.2019	TIME: 03"30 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT - 01	COMPUTER-BASED INTERFACE 01	COMPUTER-BASED INTERFACE 02	COMPUTER-BASED INTERFACE 03	COMPUTER-BASED INTERFACE 04	CONTRAST - 05
positive cognitive effort when selecting the text	1	4	1	5	no feelings for the text chosen
pride of authorship when genereting the pattern	3	2	5	5	that is not my pattern
easy to make decisions	4	2	4	3	high level of confusion at the time to make decisions
it is a representation of myself	5	5	5	5	I cannot see myself in the textile
easy to navigate	1	1	5	5	hard to understand the steps
I feel emotionally attached with the final textile	2	3	2	5	it is a mere textile that I have been involved in the design process
previous experience with woven textiles helped me to decide which weave structures and yarns bring Emotional Experience to me	1	1	1	1	previous experience with woven textiles did not help me to decide which weave structures and yarns bring Emotional Experience to me
pride of authorship with the final textile	3	5	2	5	that is not my creation
the textile sample helped me to make decisions regarding which yarn and weave structure bring E.E.	1	1	1	1	the textile sample did not help me to make decisions regarding yarn and weave structure

Table 7. 68. Participant H – computer-based interfaces analysis RGT sheet.



STAGE TWO: THE ELICITATION OF EMOTIONAL EXPERIENCE DURING COMPUTER-LED CO-DESIGN EXPERIENCE

PARTICIPANT NO: PARTICIPANT H	RGT: COMPUTER-BASED INTERFACES ■	
DATE: 13.11.2019	TIME: 03"30 AM	PLACE: BENZIE BUILDING ROOM BZ314

CONSTRUCT – 01					CONTRAST – 05
THE TEXTILE SAMPLE HELPED ME TO MAKE DECISIONS REGARDING WHICH YARN AND WEAVE STRUCTURE BRING E.E.	5	5	1	1	THE TEXTILE SAMPLE DID NOT HELP ME TO MAKE DECISIONS REGARDING YARN AND WEAVE STRUCTURE
I FEEL EMOTIONALLY ATTACHED WITH THE FINAL TEXTILE	5	5	3	2	IT IS A MERE TEXTILE THAT I HAVE BEEN INVOLVED IN THE DESIGN PROCESS
PRIDE OF AUTHORSHIP WHEN GENERETING THE PATTERN	3	4	4	2	THAT IS NOT MY PATTERN
EASY TO NAVIGATE	1	4	4	3	HARD TO UNDERSTAND THE STEPS
PREVIOUS EXPERIENCE WITH WOVEN TEXTILES HELPED ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME	1	5	5	2	PREVIOUS EXPERIENCE WITH WOVEN TEXTILES DID NOT HELP ME TO DECIDE WHICH WEAVE STRUCTURES AND YARNS BRING EMOTIONAL EXPERIENCE TO ME
IT IS A REPRESENTATION OF MYSELF	5	2	5	5	I CANNOT SEE MYSELF IN THE TEXTILE
EASY TO MAKE DECISIONS	5	5	5	5	HIGH LEVEL OF CONFUSION AT THE TIME TO MAKE DECISIONS
PRIDE OF AUTHORSHIP WITH THE FINAL TEXTILE	5	5	5	5	THAT IS NOT MY CREATION
POSITIVE COGNITIVE EFFORT WHEN SELECTING THE TEXT	5	5	5	5	NO FEELINGS FOR THE TEXT CHOSEN

Table 7. 69. Participant H – computer-based interfaces analysis RGT sheet focus cluster analysis.

7.7. APPENDIX G: STAGE THREE REPERTORY GRID TECHNIQUE INTERVIEWS

Participant A

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT A	RGT: TACTILE ■ VISUAL ☐	TACTILE & VISUAL ☐
DATE: 25.02.2020	TIME: 11 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
it reminds me of cloths that I used to have	2	1	4	5	curtain fabric - less personal
flatter texture (something that I used to have)	1	1	2	3	Primary teacher used to wear
grandma's table cloth, thinner, more worn, specific	3	4	3	5	thicker, curtain fabric (to be there but not allow to touch it or play with
jumper not as comfortable as expected, expected to wear it once	4	3	4	2	closer to what I would wear just now
texture, flatter, newer	4	5	4	4	nice contrast to it, carpet texture (school carpet)
clothes that I would pick up for myself	2	2	3	3	mum used to pick up for me
textured	4	4	5	4	smoother, flat (like a textile at home)
like soft furnishing	1	1	1	4	like something harder, functional
flatter texture, interesting to touch	2	1	1	2	fancy pattern
like a rug or something at home	2	1	3	4	more curtian-like
functional, like a bag for use	4	4	4	3	more decorative
fluffier, worn in, comfier	1	1	1	4	still new, crisp
softer pattern, homely	1	1	1	3	stiffer - formal
something that I'd buy it or have for myself	3	3	2	5	reminds me of something of my grandpa's house
fancy pattern, flat and movable	3	2	3	5	a little bit scratchy
visual thing, heavily patterned	4	4	2	3	something that you see and use everyday
more worn - seen a lot of years	1	2	1	4	newer, sharpper
texture thing, smoother, they feel thicker	2	1	3	4	has more texture, ribs of the table cloth
pride of authorship	2	2	1	3	that is not my creation
I feel emotionally attached with the final creation	3	2	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	2	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	1	2	2	the coded pattern did not help at all

Table 7. 70. Participant A - stage three tactile unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME					
PARTICIPANT NO: PARTICIPANT A	RGT:	TACTILE ■	VISUAL ☐	TACTILE & VISUAL ☐	
DATE: 25.02.2020	TIME: 11 AM			PLACE: BENZIE BUILDING BZ314	

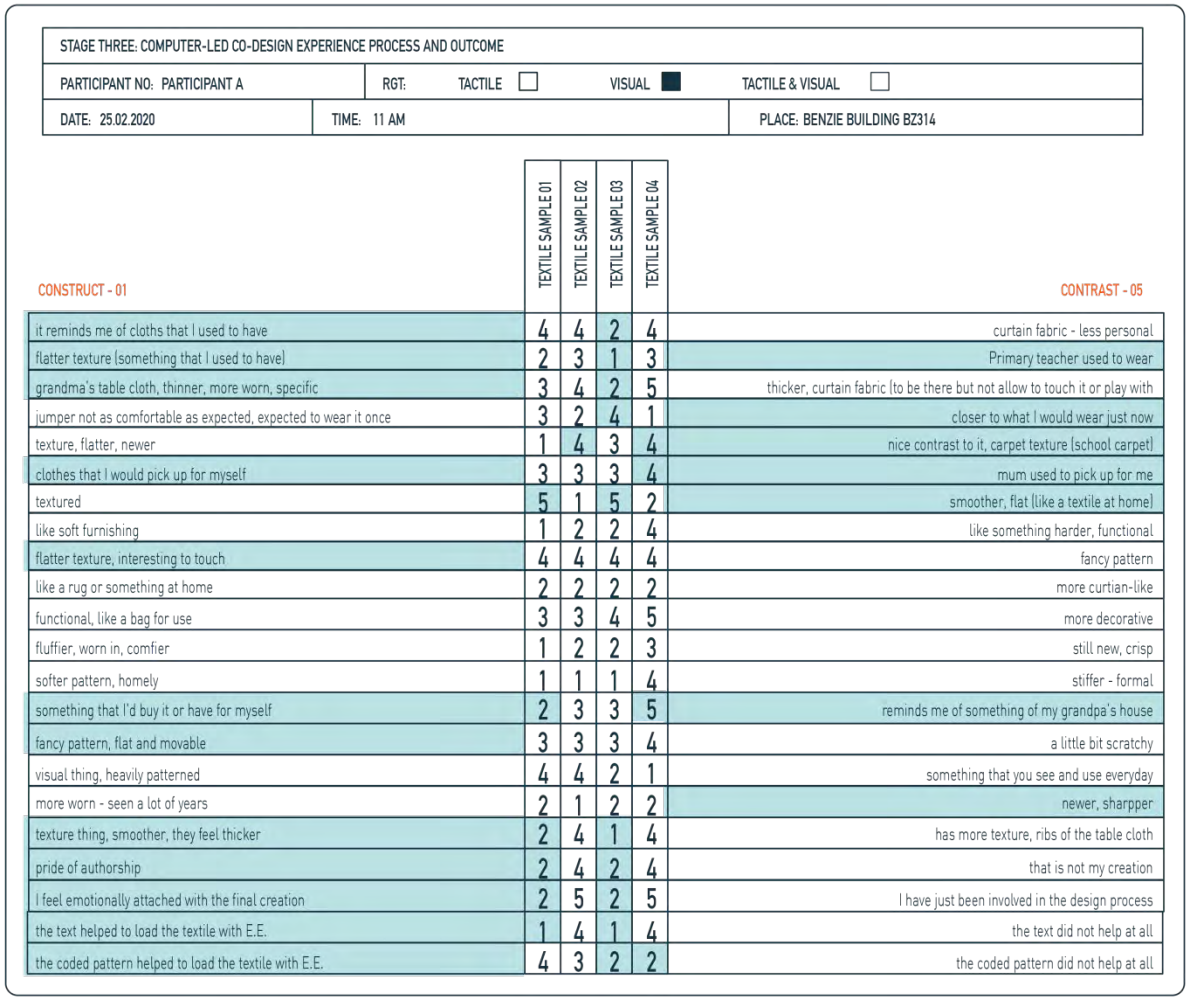
CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
it reminds me of cloths that I used to have	2	1	4	5	curtain fabric - less personal
flatter texture (something that I used to have)	1	1	2	3	Primary teacher used to wear
grandma's table cloth, thinner, more worn, specific	3	4	3	5	thicker, curtain fabric (to be there but not allow to touch it or play with
jumper not as comfortable as expected, expected to wear it once	4	3	4	2	closer to what I would wear just now
texture, flatter, newer	4	5	4	4	nice contrast to it, carpet texture (school carpet)
clothes that I would pick up for myself	2	2	3	3	mum used to pick up for me
textured	4	4	5	4	smoother, flat (like a textile at home)
like soft furnishing	1	1	1	4	like something harder, functional
flatter texture, interesting to touch	2	1	1	2	fancy pattern
like a rug or something at home	2	1	3	4	more curtian-like
functional, like a bag for use	4	4	4	3	more decorative
fluffier, worn in, comfier	1	1	1	4	still new, crisp
softer pattern, homely	1	1	1	3	stiffer - formal
something that I'd buy it or have for myself	3	3	2	5	reminds me of something of my grandpa's house
fancy pattern, flat and movable	3	2	3	5	a little bit scratchy
visual thing, heavily patterned	4	4	2	3	something that you see and use everyday
more worn - seen a lot of years	1	2	1	4	newer, sharpper
texture thing, smoother, they feel thicker	2	1	3	4	has more texture, ribs of the table cloth
pride of authorship	2	2	1	3	that is not my creation
I feel emotionally attached with the final creation	3	2	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	2	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	1	2	2	the coded pattern did not help at all

Table 7. 71. Participant A - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT A	RGT: TACTILE ☐ VISUAL ■	TACTILE & VISUAL ☐
DATE: 25.02.2020	TIME: 11 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
it reminds me of cloths that I used to have	4	4	2	4	curtain fabric - less personal
flatter texture (something that I used to have)	2	3	1	3	Primary teacher used to wear
grandma's table cloth, thinner, more worn, specific	3	4	2	5	thicker, curtain fabric (to be there but not allow to touch it or play with
jumper not as comfortable as expected, expected to wear it once	3	2	4	1	closer to what I would wear just now
texture, flatter, newer	1	4	3	4	nice contrast to it, carpet texture (school carpet)
clothes that I would pick up for myself	3	3	3	4	mum used to pick up for me
textured	5	1	5	2	smoother, flat (like a textile at home)
like soft furnishing	1	2	2	4	like something harder, functional
flatter texture, interesting to touch	4	4	4	4	fancy pattern
like a rug or something at home	2	2	2	2	more curtian-like
functional, like a bag for use	3	3	4	5	more decorative
fluffier, worn in, comfier	1	2	2	3	still new, crisp
softer pattern, homely	1	1	1	4	stiffer - formal
something that I'd buy it or have for myself	2	3	3	5	reminds me of something of my grandpa's house
fancy pattern, flat and movable	3	3	3	4	a little bit scratchy
visual thing, heavily patterned	4	4	2	1	something that you see and use everyday
more worn - seen a lot of years	2	1	2	2	newer, sharpper
texture thing, smoother, they feel thicker	2	4	1	4	has more texture, ribs of the table cloth
pride of authorship	2	4	2	4	that is not my creation
I feel emotionally attached with the final creation	2	5	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	3	2	2	the coded pattern did not help at all

Table 7. 72. Participant A - stage three visual unimodal analysis RGT sheet.



STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT A | RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐

DATE: 25.02.2020 | TIME: 11 AM | PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
it reminds me of cloths that I used to have	4	4	2	4	curtain fabric - less personal
flatter texture (something that I used to have)	2	3	1	3	Primary teacher used to wear
grandma's table cloth, thinner, more worn, specific	3	4	2	5	thicker, curtain fabric (to be there but not allow to touch it or play with
jumper not as comfortable as expected, expected to wear it once	3	2	4	1	closer to what I would wear just now
texture, flatter, newer	1	4	3	4	nice contrast to it, carpet texture (school carpet)
clothes that I would pick up for myself	3	3	3	4	mum used to pick up for me
textured	5	1	5	2	smoother, flat (like a textile at home)
like soft furnishing	1	2	2	4	like something harder, functional
flatter texture, interesting to touch	4	4	4	4	fancy pattern
like a rug or something at home	2	2	2	2	more curtian-like
functional, like a bag for use	3	3	4	5	more decorative
fluffier, worn in, comfier	1	2	2	3	still new, crisp
softer pattern, homely	1	1	1	4	stiffer - formal
something that I'd buy it or have for myself	2	3	3	5	reminds me of something of my grandpa's house
fancy pattern, flat and movable	3	3	3	4	a little bit scratchy
visual thing, heavily patterned	4	4	2	1	something that you see and use everyday
more worn - seen a lot of years	2	1	2	2	newer, sharpper
texture thing, smoother, they feel thicker	2	4	1	4	has more texture, ribs of the table cloth
pride of authorship	2	4	2	4	that is not my creation
I feel emotionally attached with the final creation	2	5	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	3	2	2	the coded pattern did not help at all

Table 7. 73. Participant A - stage three visual unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT A	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 25.02.2020	TIME: 11 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
it reminds me of cloths that I used to have	2	4	1	4	curtain fabric - less personal
flatter texture (something that I used to have)	2	2	2	5	Primary teacher used to wear
grandma's table cloth, thinner, more worn, specific	1	4	2	5	thicker, curtain fabric (to be there but not allow to touch it or play with
jumper not as comfortable as expected, expected to wear it once	4	3	4	2	closer to what I would wear just now
texture, flatter, newer	3	2	2	5	nice contrast to it, carpet texture (school carpet)
clothes that I would pick up for myself	2	4	4	3	mum used to pick up for me
textured	4	4	3	1	smoother, flat (like a textile at home)
like soft furnishing	3	1	4	2	like something harder, functional
flatter texture, interesting to touch	2	4	1	4	fancy pattern
like a rug or something at home	2	2	2	4	more curtian-like
functional, like a bag for use	4	3	3	4	more decorative
fluffier, worn in, comfier	4	2	1	5	still new, crisp
softer pattern, homely	3	2	2	4	stiffer - formal
something that I'd buy it or have for myself	4	4	3	4	reminds me of something of my grandpa's house
fancy pattern, flat and movable	2	2	1	5	a little bit scratchy
visual thing, heavily patterned	1	3	2	1	something that you see and use everyday
more worn - seen a lot of years	2	2	1	4	newer, sharpper
texture thing, smoother, they feel thicker	1	4	3	3	has more texture, ribs of the table cloth
pride of authorship	3	4	2	4	that is not my creation
I feel emotionally attached with the final creation	2	4	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	5	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	2	2	3	the coded pattern did not help at all

Table 7. 74. Participant A - stage three tactile-visual bimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT A	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 25.02.2020	TIME: 11 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
it reminds me of cloths that I used to have	2	4	1	4	curtain fabric - less personal
flatter texture (something that I used to have)	2	2	2	5	Primary teacher used to wear
grandma's table cloth, thinner, more worn, specific	1	4	2	5	thicker, curtain fabric (to be there but not allow to touch it or play with
jumper not as comfortable as expected, expected to wear it once	4	3	4	2	closer to what I would wear just now
texture, flatter, newer	3	2	2	5	nice contrast to it, carpet texture (school carpet)
clothes that I would pick up for myself	2	4	4	3	mum used to pick up for me
textured	4	4	3	1	smoother, flat (like a textile at home)
like soft furnishing	3	1	4	2	like something harder, functional
flatter texture, interesting to touch	2	4	1	4	fancy pattern
like a rug or something at home	2	2	2	4	more curtian-like
functional, like a bag for use	4	3	3	4	more decorative
fluffier, worn in, comfier	4	2	1	5	still new, crisp
softer pattern, homely	3	2	2	4	stiffer - formal
something that I'd buy it or have for myself	4	4	3	4	reminds me of something of my grandpa's house
fancy pattern, flat and movable	2	2	1	5	a little bit scratchy
visual thing, heavily patterned	1	3	2	1	something that you see and use everyday
more worn - seen a lot of years	2	2	1	4	newer, sharpper
texture thing, smoother, they feel thicker	1	4	3	3	has more texture, ribs of the table cloth
pride of authorship	3	4	2	4	that is not my creation
I feel emotionally attached with the final creation	2	4	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	5	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	2	2	3	the coded pattern did not help at all

Table 7. 75. Participant A - stage three tactile-tactile bimodal analysis RGT sheet focus analysis.

Participant B

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ■	VISUAL ☐	TACTILE & VISUAL ☐
DATE: 20.02.2020	TIME: 09 AM		PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
a satin sofa - I have one like that	4	2	3	2	silk bedding
soft and harsh - A tote bag	3	4	4	1	harsh material - traditional welsh cloth, I think it's brown
neutral in colour, similar texture that tote bags	5	5	1	1	nicer material because it's softness and bright colour
like a velvety coat, mum's coat with stone colour	3	3	4	5	feels like the sofa again - ot leather sofa
right, stitches in and out	1	1	2	1	softer and flat surface
rubbing the sofa, it's a little bit worn	3	3	1	2	I like it the most. It feels it is a new sofa
woven rug	5	1	1	1	bed throw
middle easter fabric	2	3	5	1	reusable bag
squares - kaleidoscope	1	2	4	2	layer of pattern
same yarn/ material	4	4	5	2	sheep weel tribal print
tiles	3	2	2	2	kaleidoscope
tapestry	1	1	1	1	school carpet
textured	1	2	1	1	plain
softer	3	4	3	3	none rough
squares	5	5	1	1	triangle
soft - similar feeling on the back	3	2	3	4	hard wearing tough
bits that are raised	1	1	1	2	flat surface
thinner thread, same colour	4	1	1	4	natural material
pride of authorship	2	2	2	4	that is not my creation
I feel emotionally attached with the final creation	2	5	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	4	2	2	the coded pattern did not help at all

Table 7. 76. Participant B - stage three tactile unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ■	VISUAL ☐	TACTILE & VISUAL ☐
DATE: 20.02.2020	TIME: 09 AM		PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
a satin sofa - I have one like that	4	2	3	2	silk bedding
soft and harsh - A tote bag	3	4	4	1	harsh material - traditional welsh cloth, I think it's brown
neutral in colour, similar texture that tote bags	5	5	1	1	nicer material because it's softness and bright colour
like a velvety coat, mum's coat with stone colour	3	3	4	5	feels like the sofa again - ot leather sofa
right, stitches in and out	1	1	2	1	softer and flat surface
rubbing the sofa, it's a little bit worn	3	3	1	2	I like it the most. It feels it is a new sofa
woven rug	5	1	1	1	bed throw
middle easter fabric	2	3	5	1	reusable bag
squares - kaleidoscope	1	2	4	2	layer of pattern
same yarn/ material	4	4	5	2	sheep weel tribal print
tiles	3	2	2	2	kaleidoscope
tapestry	1	1	1	1	school carpet
textured	1	2	1	1	plain
softer	3	4	3	3	none rough
squares	5	5	1	1	triangle
soft - similar feeling on the back	3	2	3	4	hard wearing tough
bits that are raised	1	1	1	2	flat surface
thinner thread, same colour	4	1	1	4	natural material
pride of authorship	2	2	2	4	that is not my creation
I feel emotionally attached with the final creation	2	5	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	4	2	2	the coded pattern did not help at all

Table 7. 77. Participant B - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 20.02.2020	TIME: 09 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
a satin sofa - I have one like that	4	5	4	5	silk bedding
soft and harsh - A tote bag	4	3	2	2	harsh material - traditional welsh cloth, I think it's brown
neutral in colour, similar texture that tote bags	2	4	4	4	nicer material because it's softness and bright colour
like a velvety coat, mum's coat with stone colour	4	3	4	3	feels like the sofa again - ot leather sofa
right, stitches in and out	2	1	1	2	softer and flat surface
rubbing the sofa, it's a little bit worn	3	4	3	2	I like it the most. It feels it is a new sofa
woven rug	3	1	4	5	bed throw
middle easter fabric	4	1	5	2	reusable bag
squares - kaleidoscope	1	5	4	4	layer of pattern
same yarn/ material	5	5	4	1	sheep weel tribal print
tiles	1	2	1	5	kaleidoscope
tapestry	1	1	4	2	school carpet
textured	1	1	2	2	plain
softer	3	2	2	2	none rough
squares	1	4	4	3	triangle
soft - similar feeling on the back	5	2	2	2	hard wearing tough
bits that are raised	1	1	3	1	flat surface
thinner thread, same colour	3	3	4	1	natural material
pride of authorship	1	2	2	2	that is not my creation
I feel emotionally attached with the final creation	1	4	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	1	2	2	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	5	5	2	the coded pattern did not help at all

Table 7. 78. Participant B - stage three visual unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 20.02.2020	TIME: 09 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
a satin sofa - I have one like that	4	5	4	5	silk bedding
soft and harsh - A tote bag	4	3	2	2	harsh material - traditional welsh cloth, I think it's brown
neutral in colour, similar texture that tote bags	2	4	4	4	nicer material because it's softness and bright colour
like a velvety coat, mum's coat with stone colour	4	3	4	3	feels like the sofa again - ot leather sofa
right, stitches in and out	2	1	1	2	softer and flat surface
rubbing the sofa, it's a little bit worn	3	4	3	2	I like it the most. It feels it is a new sofa
woven rug	3	1	4	5	bed throw
middle easter fabric	4	1	5	2	reusable bag
squares - kaleidoscope	1	5	4	4	layer of pattern
same yarn/ material	5	5	4	1	sheep weel tribal print
tiles	1	2	1	5	kaleidoscope
tapestry	1	1	4	2	school carpet
textured	1	1	2	2	plain
softer	3	2	2	2	none rough
squares	1	4	4	3	triangle
soft - similar feeling on the back	5	2	2	2	hard wearing tough
bits that are raised	1	1	3	1	flat surface
thinner thread, same colour	3	3	4	1	natural material
pride of authorship	1	2	2	2	that is not my creation
I feel emotionally attached with the final creation	1	4	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	1	2	2	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	5	5	2	the coded pattern did not help at all

Table 7. 79. Participant B - stage three visual unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 20.02.2020	TIME: 09 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
a satin sofa - I have one like that	5	5	4	4	silk bedding
soft and harsh - A tote bag	2	3	3	4	harsh material - traditional welsh cloth, I think it's brown
neutral in colour, similar texture that tote bags	4	4	5	1	nicer material because it's softness and bright colour
like a velvety coat, mum's coat with stone colour	1	3	1	5	feels like the sofa again - ot leather sofa
right, stitches in and out	2	2	1	4	softer and flat surface
rubbing the sofa, it's a little bit worn	4	3	4	2	I like it the most. It feels it is a new sofa
woven rug	4	5	2	5	bed throw
middle easter fabric	2	2	3	1	reusable bag
squares - kaleidoscope	4	4	2	3	layer of pattern
same yarn/ material	5	5	3	4	sheep weel tribal print
tiles	3	4	1	2	plain kaleidoscope
tapestry	2	2	5	1	school carpet
textured	2	2	1	1	plain
softer	3	2	2	3	none rough
squares	3	3	1	4	triangle
soft - similar feeling on the back	4	2	3	4	hard wearing tough
bits that are raised	1	1	1	3	flat surface
thinner thread, same colour	4	4	2	2	natural material
pride of authorship	1	4	2	2	that is not my creation
I feel emotionally attached with the final creation	1	4	3	3	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	2	5	2	the coded pattern did not help at all

Table 7. 80. Participant B - stage three tactile-visual bimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT B	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 20.02.2020	TIME: 09 AM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
a satin sofa - I have one like that	5	5	4	4	silk bedding
soft and harsh - A tote bag	2	3	3	4	harsh material - traditional welsh cloth, I think it's brown
neutral in colour, similar texture that tote bags	4	4	5	1	nicer material because it's softness and bright colour
like a velvety coat, mum's coat with stone colour	1	3	1	5	feels like the sofa again - ot leather sofa
right, stitches in and out	2	2	1	4	softer and flat surface
rubbing the sofa, it's a little bit worn	4	3	4	2	I like it the most. It feels it is a new sofa
woven rug	4	5	2	5	bed throw
middle easter fabric	2	2	3	1	reusable bag
squares - kaleidoscope	4	4	2	3	layer of pattern
same yarn/ material	5	5	3	4	sheep weel tribal print
tiles	3	4	1	2	plain kaleidoscope
tapestry	2	2	5	1	school carpet
textured	2	2	1	1	plain
softer	3	2	2	3	none rough
squares	3	3	1	4	triangle
soft - similar feeling on the back	4	2	3	4	hard wearing tough
bits that are raised	1	1	1	3	flat surface
thinner thread, same colour	4	4	2	2	natural material
pride of authorship	1	4	2	2	that is not my creation
I feel emotionally attached with the final creation	1	4	3	3	I have just been involved in the design process
the text helped to load the textile with E.E.	1	4	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	2	5	2	the coded pattern did not help at all

Table 7. 81. Participant B - stage three tactile-visual bimodal analysis RGT sheet focus analysis.

Participant C

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT C | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 28.02.2020 | TIME: 10 AM | PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
tail of a horse	3	3	3	2	smooth, bed sheet
tablecloth. Feel the underneeth	2	2	1	3	I don't like it at all, it doesn't feel nice. Scarf/blanket that looses the fibers
I like these, personal like, they are smooth	1	2	2	4	I don't like the loose bit of fibre coming out
animal life again	4	3	3	2	bits of threads and lines, it feels softer, but I could pull it apart
rough - blanket that fibres come out	5	5	5	3	smooth, I feel I don't have anything on my hands
bounce on top, has layers, like high scool carpet	4	3	4	2	flat, it doesn't remind me of anything in particular
reminds me of a blanket at home	2	3	4	3	doesn't remind me of anything
vintage old patterns on curtains	2	2	4	1	plain, flat like a cloth, napkin - italian resturant
shiny, neckets light, old grandma cloths	3	3	1	3	dry, potato bag
doesn't remind me of anything	2	1	2	2	pillow case, soft and flat, similar to my grey one
textile around the house	1	3	1	1	potato bag, rough
ripples in the sand on the beach near water	2	3	4	3	doesn't remind me of anything
a blanket that I have at home, because the diagonal weave	2	5	4	3	silky and smooth - italian restaurant napkin
nothing in particular - smooth and flat, I like them	3	2	4	5	Grandma sofa's cover. It's really old (horrible and ugly)
they are both smooth and silky	2	2	2	3	vegetable bag, where I store the potatoes
vintage blanket	1	2	3	1	plain, without texture. It could be a pillow case. Something ot have on the bed
blanket at home	1	2	3	2	very flat
fancy and more interesting because of the pattern	3	1	4	1	no texure or pattern - restaurant napkin
pride of authorship	1	3	1	4	that is not my creation
I feel emotionally attached with the final creation	2	4	1	4	I have just been involved in the design process
the text helped to load the textile with E.E.	3	4	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	2	1	2	3	the coded pattern did not help at all

Table 7. 82. Participant C - stage three tactile unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT C	RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐	
DATE: 28.02.2020	TIME: 10 AM	PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
tail of a horse	3	3	3	2	smooth, bed sheet
tablecloth. Feel the underneeth	2	2	1	3	I don't like it at all, it doesn't feel nice. Scarf/blanket that looses the fibers
I like these, personal like, they are smooth	1	2	2	4	I don't like the loose bit of fibre coming out
animal life again	4	3	3	2	bits of threads and lines, it feels softer, but I could pull it apart
rough - blanket that fibres come out	5	5	5	3	smooth, I feel I don't have anything on my hands
bounce on top, has layers, like high scool carpet	4	3	4	2	flat, it doesn't remind me of anything in particular
reminds me of a blanket at home	2	3	4	3	doesn't remind me of anything
vintage old patterns on curtains	2	2	4	1	plain, flat like a cloth, napkin - italian resturant
shiny, neckets light, old grandma cloths	3	3	1	3	dry, potato bag
doesn't remind me of anything	2	1	2	2	pillow case, soft and flat, similar to my grey one
textile around the house	1	3	1	1	potato bag, rough
ripples in the sand on the beach near water	2	3	4	3	doesn't remind me of anything
a blanket that I have at home, because the diagonal weave	2	5	4	3	silky and smooth - italian restaurant napkin
nothing in particular - smooth and flat, I like them	3	2	4	5	Grandma sofa's cover. It's really old (horrible and ugly)
they are both smooth and silky	2	2	2	3	vegetable bag, where I store the potatoes
vintage blanket	1	2	3	1	plain, without texture. It could be a pillow case. Something ot have on the bed
blanket at home	1	2	3	2	very flat
fancy and more interesting because of the pattern	3	1	4	1	no texure or pattern - restaurant napkin
pride of authorship	1	3	1	4	that is not my creation
I feel emotionally attached with the final creation	2	4	1	4	I have just been involved in the design process
the text helped to load the textile with E.E.	3	4	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	2	1	2	3	the coded pattern did not help at all

Table 7. 83. Participant C - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT C	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 28.02.2020	TIME: 10 AM	PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
tail of a horse	3	3	3	3	smooth, bed sheet
tablecloth. Feel the underneeth	3	2	1	3	I don't like it at all, it doesn't feel nice. Scarf/blanket that looses the fibers
I like these, personal like, they are smooth	1	1	1	1	I don't like the loose bit of fibre coming out
animal life again	4	3	3	4	bits of threads and lines, it feels softer, but I could pull it apart
rough - blanket that fibres come out	5	5	5	3	smooth, I feel I don't have anything on my hands
bounce on top, has layers, like high scool carpet	5	4	4	4	flat, it doesn't remind me of anything in particular
reminds me of a blanket at home	5	4	4	5	doesn't remind me of anything
vintage old patterns on curtains	3	1	1	3	plain, flat like a cloth, napkin - italian resturant
shiny, neckets light, old grandma cloths	3	1	1	3	dry, potato bag
doesn't remind me of anything	1	3	2	1	pillow case, soft and flat, similar to my grey one
textile around the house	1	1	1	2	potato bag, rough
ripples in the sand on the beach near water	5	3	4	5	doesn't remind me of anything
a blanket that I have at home, because the diagonal weave	2	3	4	3	silky and smooth - italian restaurant napkin
nothing in particular - smooth and flat, I like them	3	5	2	3	Grandma sofa's cover. It's really old (horrible and ugly)
they are both smooth and silky	1	1	1	3	vegetable bag, where I store the potatoes
vintage blanket	2	3	3	2	plain, without texture. It could be a pillow case. Something ot habve on the bed
blanket at home	3	4	4	2	very flat
fancy and more interesting because of the pattern	1	1	1	1	no texure or pattern - restaurant napkin
pride of authorship	1	4	1	4	that is not my creation
I feel emotionally attached with the final creation	1	4	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	2	3	2	the coded pattern did not help at all

Table 7. 84. Participant C - stage three visual unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT C	RGT: TACTILE ☐ VISUAL ■	TACTILE & VISUAL ☐
DATE: 28.02.2020	TIME: 10 AM	PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
tail of a horse	3	3	3	3	smooth, bed sheet
tablecloth. Feel the underneeth	3	2	1	3	I don't like it at all, it doesn't feel nice. Scarf/blanket that looses the fibers
I like these, personal like, they are smooth	1	1	1	1	I don't like the loose bit of fibre coming out
animal life again	4	3	3	4	bits of threads and lines, it feels softer, but I could pull it apart
rough - blanket that fibres come out	5	5	5	3	smooth, I feel I don't have anything on my hands
bounce on top, has layers, like high scool carpet	5	4	4	4	flat, it doesn't remind me of anything in particular
reminds me of a blanket at home	5	4	4	5	doesn't remind me of anything
vintage old patterns on curtains	3	1	1	3	plain, flat like a cloth, napkin - italian resturant
shiny, neckets light, old grandma cloths	3	1	1	3	dry, potato bag
doesn't remind me of anything	1	3	2	1	pillow case, soft and flat, similar to my grey one
textile around the house	1	1	1	2	potato bag, rough
ripples in the sand on the beach near water	5	3	4	5	doesn't remind me of anything
a blanket that I have at home, because the diagonal weave	2	3	4	3	silky and smooth - italian restaurant napkin
nothing in particular - smooth and flat, I like them	3	5	2	3	Grandma sofa's cover. It's really old (horrible and ugly)
they are both smooth and silky	1	1	1	3	vegetable bag, where I store the potatoes
vintage blanket	2	3	3	2	plain, without texture. It could be a pillow case. Something ot have on the bed
blanket at home	3	4	4	2	very flat
fancy and more interesting because of the pattern	1	1	1	1	no texure or pattern - restaurant napkin
pride of authorship	1	4	1	4	that is not my creation
I feel emotionally attached with the final creation	1	4	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	2	3	2	the coded pattern did not help at all

Table 7. 85. Participant C - stage three visual unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT C	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 28.02.2020	TIME: 10 AM	PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
tail of a horse	3	3	3	2	smooth, bed sheet
tablecloth. Feel the underneeth	3	2	1	4	I don't like it at all, it doesn't feel nice. Scarf/blanket that looses the fibers
I like these, personal like, they are smooth	1	1	3	3	I don't like the loose bit of fibre coming out
animal life again	4	3	3	2	bits of threads and lines, it feels softer, but I could pull it apart
rough - blanket that fibres come out	5	5	4	2	smooth, I feel I don't have anything on my hands
bounce on top, has layers, like high scool carpet	5	4	5	2	flat, it doesn't remind me of anything in particular
reminds me of a blanket at home	5	3	5	4	doesn't remind me of anything
vintage old patterns on curtains	2	1	2	3	plain, flat like a cloth, napkin - italian resturant
shiny, neckets light, old grandma cloths	3	3	1	3	dry, potato bag
doesn't remind me of anything	1	3	1	2	pillow case, soft and flat, similar to my grey one
textile around the house	2	1	1	1	potato bag, rough
ripples in the sand on the beach near water	5	3	5	4	doesn't remind me of anything
a blanket that I have at home, because the diagonal weave	3	4	4	2	silky and smooth - italian restaurant napkin
nothing in particular - smooth and flat, I like them	2	5	1	4	Grandma sofa's cover. It's really old (horrible and ugly)
they are both smooth and silky	2	1	3	4	vegetable bag, where I store the potatoes
vintage blanket	3	3	3	1	plain, without texture. It could be a pillow case. Something ot have on the bed
blanket at home	3	4	5	3	very flat
fancy and more interesting because of the pattern	1	1	3	1	no texure or pattern - restaurant napkin
pride of authorship	2	3	1	4	that is not my creation
I feel emotionally attached with the final creation	2	3	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	5	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	4	4	3	the coded pattern did not help at all

Table 7. 86. Participant C - stage three tactile-visual bimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT C	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 28.02.2020	TIME: 10 AM	PLACE: RIGHTON BUILDING ROOM 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
tail of a horse	3	3	3	2	smooth, bed sheet
tablecloth. Feel the underneeth	3	2	1	4	I don't like it at all, it doesn't feel nice. Scarf/blanket that looses the fibers
I like these, personal like, they are smooth	1	1	3	3	I don't like the loose bit of fibre coming out
animal life again	4	3	3	2	bits of threads and lines, it feels softer, but I could pull it apart
rough - blanket that fibres come out	5	5	4	2	smooth, I feel I don't have anything on my hands
bounce on top, has layers, like high scool carpet	5	4	5	2	flat, it doesn't remind me of anything in particular
reminds me of a blanket at home	5	3	5	4	doesn't remind me of anything
vintage old patterns on curtains	2	1	2	3	plain, flat like a cloth, napkin - italian resturant
shiny, neckets light, old grandma cloths	3	3	1	3	dry, potato bag
doesn't remind me of anything	1	3	1	2	pillow case, soft and flat, similar to my grey one
textile around the house	2	1	1	1	potato bag, rough
ripples in the sand on the beach near water	5	3	5	4	doesn't remind me of anything
a blanket that I have at home, because the diagonal weave	3	4	4	2	silky and smooth - italian restaurant napkin
nothing in particular - smooth and flat, I like them	2	5	1	4	Grandma sofa's cover. It's really old (horrible and ugly)
they are both smooth and silky	2	1	3	4	vegetable bag, where I store the potatoes
vintage blanket	3	3	3	1	plain, without texture. It could be a pillow case. Something ot have on the bed
blanket at home	3	4	5	3	very flat
fancy and more interesting because of the pattern	1	1	3	1	no texure or pattern - restaurant napkin
pride of authorship	2	3	1	4	that is not my creation
I feel emotionally attached with the final creation	2	3	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	5	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	4	4	3	the coded pattern did not help at all

Table 7. 87. Participant C - stage three tactile-visual bimodal analysis RGT sheet.

Participant D

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT D	RGT: TACTILE ■ VISUAL ☐	TACTILE & VISUAL ☐
DATE: 12.03.2020	TIME: 1:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
clothes that I have owned. Trausers that they look nice but to hot to wear them	2	5	2	3	I don't like it, the fabric feels like scratching my nails on a blackboard
I don't like them, school uniform. Itchy and horrible clothes	3	1	4	3	outside of a coat. I'm not sure what this is. I've never encountered it
clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	2	5	4	2	discomfort, comfortable old cushion. Not related to each other, rougher
these are not eliciting any emotional reaction. Similar in one side	4	3	5	4	nice bag, old cushion. It feels comfortable and familiar
these feel itchy, the touch is horrible	3	1	5	4	feels comfortable. I'd have a cushion pillow made of this
comfortable grandmother's sofa	2	1	4	3	it feels more real
they look soft and silky	2	5	1	3	looks rougher
they look like things I'd own	2	5	1	4	too rough, too scratchy
white squares quite hypnotic	3	3	4	2	soft diamonds, smooth look
neat, perfectly,I like the pattern	2	3	1	2	discoloured and ugly
feel like a fabric already worn	4	3	4	3	higer quality
childhood school trip	3	4	3	4	tea towel, boring
makes me think about getting into bed	3	3	2	3	reminds me of receiving a post (nice)
like a school sport day (cold)	5	1	5	4	like a National Trust house
ice-cream cone - trip to grandparents	3	2	3	1	no emotional response
being warm in a very cold place	3	4	2	4	factory tour
soft quality	1	5	1	2	rough quality
summer	4	5	3	4	winter
pride of authorship	2	4	1	3	that is not my creation
I feel emotionally attached with the final creation	2	2	2	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	5	3	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	5	4	5	4	the coded pattern did not help at all

Table 7. 88. Participant D - stage three tactile unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT D	RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐	
DATE: 12.03.2020	TIME: 1:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
clothes that I have owned. Trausers that they look nice but to hot to wear them	2	5	2	3	I don't like it, the fabric feels like scratching my nails on a blackboard
I don't like them, school uniform. Itchy and horrible clothes	3	1	4	3	outside of a coat. I'm not sure what this is. I've never encountered it
clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	2	5	4	2	discomfort, comfortable old cushion. Not related to each other, rougher
these are not eliciting any emotional reaction. Similar in one side	4	3	5	4	nice bag, old cushion. It feels comfortable and familiar
these feel itchy, the touch is horrible	3	1	5	4	feels comfortable. I'd have a cushion pillow made of this
comfortable grandmother's sofa	2	1	4	3	it feels more real
they look soft and silky	2	5	1	3	looks rougher
they look like things I'd own	2	5	1	4	too rough, too scratchy
white squares quite hypnotic	3	3	4	2	soft diamonds, smooth look
neat, perfectly,I like the pattern	2	3	1	2	discoloured and ugly
feel like a fabric already worn	4	3	4	3	higer quality
childhood school trip	3	4	3	4	tea towel, boring
makes me think about getting into bed	3	3	2	3	reminds me of receiving a post (nice)
like a school sport day (cold)	5	1	5	4	like a National Trust house
ice-cream cone - trip to grandparents	3	2	3	1	no emotional response
being warm in a very cold place	3	4	2	4	factory tour
soft quality	1	5	1	2	rough quality
summer	4	5	3	4	winter
pride of authorship	2	4	1	3	that is not my creation
I feel emotionally attached with the final creation	2	2	2	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	5	3	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	5	4	5	4	the coded pattern did not help at all

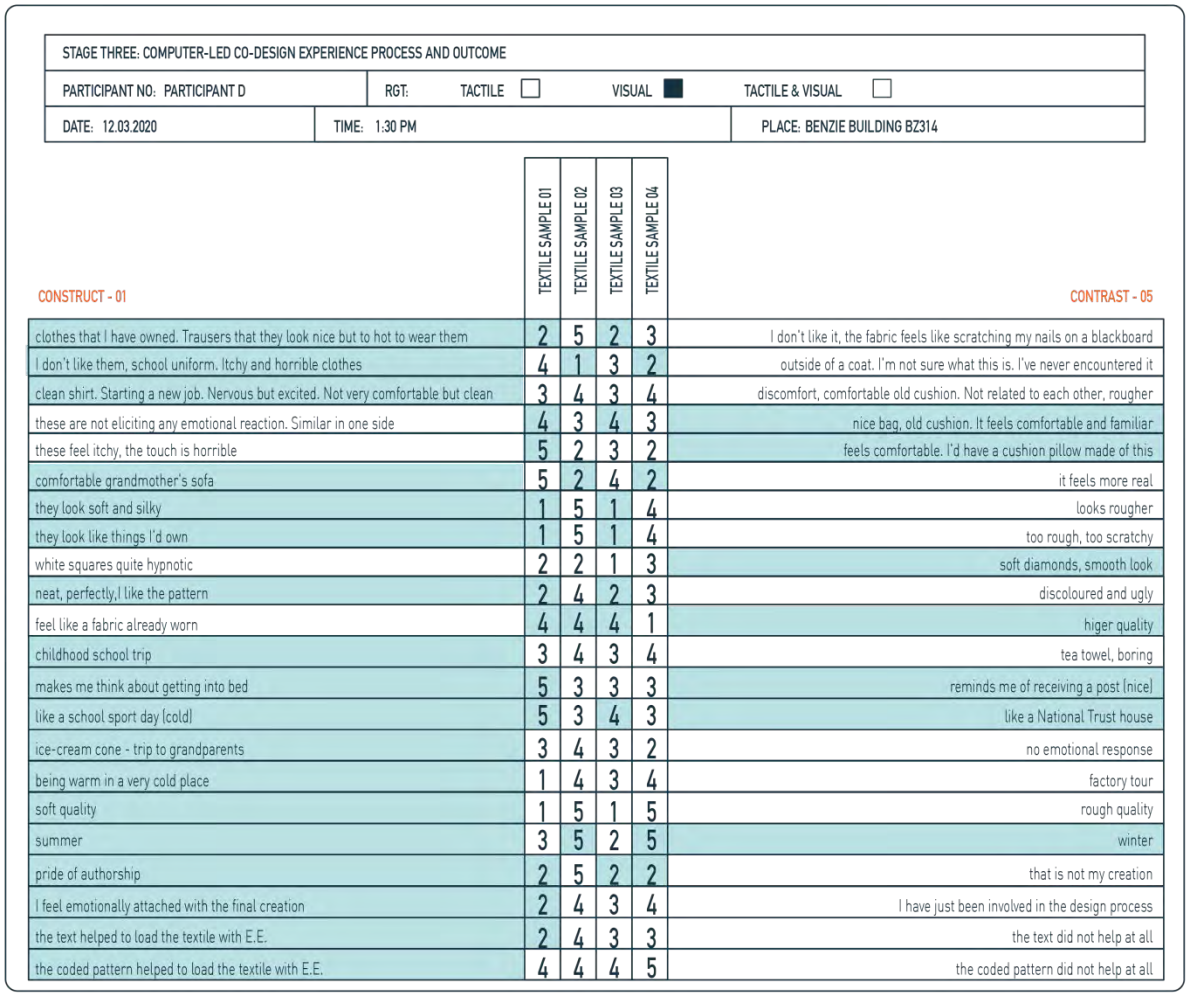
Table 7. 89. Participant D - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT D	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 12.03.2020	TIME: 1:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
clothes that I have owned. Trausers that they look nice but to hot to wear them	2	5	2	3	I don't like it, the fabric feels like scratching my nails on a blackboard
I don't like them, school uniform. Itchy and horrible clothes	4	1	3	2	outside of a coat. I'm not sure what this is. I've never encountered it
clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	3	4	3	4	discomfort, comfortable old cushion. Not related to each other, rougher
these are not eliciting any emotional reaction. Similar in one side	4	3	4	3	nice bag, old cushion. It feels comfortable and familiar
these feel itchy, the touch is horrible	5	2	3	2	feels comfortable. I'd have a cushion pillow made of this
comfortable grandmother's sofa	5	2	4	2	it feels more real
they look soft and silky	1	5	1	4	looks rougher
they look like things I'd own	1	5	1	4	too rough, too scratchy
white squares quite hypnotic	2	2	1	3	soft diamonds, smooth look
neat, perfectly,I like the pattern	2	4	2	3	discoloured and ugly
feel like a fabric already worn	4	4	4	1	higer quality
childhood school trip	3	4	3	4	tea towel, boring
makes me think about getting into bed	5	3	3	3	reminds me of receiving a post (nice)
like a school sport day (cold)	5	3	4	3	like a National Trust house
ice-cream cone - trip to grandparents	3	4	3	2	no emotional response
being warm in a very cold place	1	4	3	4	factory tour
soft quality	1	5	1	5	rough quality
summer	3	5	2	5	winter
pride of authorship	2	5	2	2	that is not my creation
I feel emotionally attached with the final creation	2	4	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	3	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	4	4	5	the coded pattern did not help at all

Table 7. 90. Participant D - stage three visual unimodal analysis RGT sheet.



STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT D	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 12.03.2020	TIME: 1:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
clothes that I have owned. Trausers that they look nice but to hot to wear them	2	5	2	3	I don't like it, the fabric feels like scratching my nails on a blackboard
I don't like them, school uniform. Itchy and horrible clothes	4	1	3	2	outside of a coat. I'm not sure what this is. I've never encountered it
clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	3	4	3	4	discomfort, comfortable old cushion. Not related to each other, rougher
these are not eliciting any emotional reaction. Similar in one side	4	3	4	3	nice bag, old cushion. It feels comfortable and familiar
these feel itchy, the touch is horrible	5	2	3	2	feels comfortable. I'd have a cushion pillow made of this
comfortable grandmother's sofa	5	2	4	2	it feels more real
they look soft and silky	1	5	1	4	looks rougher
they look like things I'd own	1	5	1	4	too rough, too scratchy
white squares quite hypnotic	2	2	1	3	soft diamonds, smooth look
neat, perfectly,I like the pattern	2	4	2	3	discoloured and ugly
feel like a fabric already worn	4	4	4	1	higer quality
childhood school trip	3	4	3	4	tea towel, boring
makes me think about getting into bed	5	3	3	3	reminds me of receiving a post (nice)
like a school sport day (cold)	5	3	4	3	like a National Trust house
ice-cream cone - trip to grandparents	3	4	3	2	no emotional response
being warm in a very cold place	1	4	3	4	factory tour
soft quality	1	5	1	5	rough quality
summer	3	5	2	5	winter
pride of authorship	2	5	2	2	that is not my creation
I feel emotionally attached with the final creation	2	4	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	3	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	4	4	5	the coded pattern did not help at all

Table 7. 91. Participant D - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT D	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 12.03.2020	TIME: 1:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
clothes that I have owned. Trausers that they look nice but to hot to wear them	1	5	2	3	I don't like it, the fabric feels like scratching my nails on a blackboard
I don't like them, school uniform. Itchy and horrible clothes	3	1	3	5	outside of a coat. I'm not sure what this is. I've never encountered it
clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	3	4	3	3	discomfort, comfortable old cushion. Not related to each other, rougher
these are not eliciting any emotional reaction. Similar in one side	5	3	3	4	nice bag, old cushion. It feels comfortable and familiar
these feel itchy, the touch is horrible	5	1	5	3	feels comfortable. I'd have a cushion pillow made of this
comfortable grandmother's sofa	5	2	4	3	it feels more real
they look soft and silky	1	5	1	2	looks rougher
they look like things I'd own	1	5	1	3	too rough, too scratchy
white squares quite hypnotic	1	4	2	4	soft diamonds, smooth look
neat, perfectly,I like the pattern	1	4	2	2	discoloured and ugly
feel like a fabric already worn	5	1	4	2	higer quality
childhood school trip	3	4	3	3	tea towel, boring
makes me think about getting into bed	2	3	2	4	reminds me of receiving a post (nice)
like a school sport day (cold)	3	3	4	4	like a National Trust house
ice-cream cone - trip to grandparents	3	3	3	3	no emotional response
being warm in a very cold place	2	4	2	2	factory tour
soft quality	1	5	1	2	rough quality
summer	2	5	4	4	winter
pride of authorship	2	3	2	2	that is not my creation
I feel emotionally attached with the final creation	2	2	2	2	I have just been involved in the design process
the text helped to load the textile with E.E.	2	3	3	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	4	3	4	the coded pattern did not help at all

Table 7. 92. Participant D - stage three tactile-visual bimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT D	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 12.03.2020	TIME: 1:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
clothes that I have owned. Trausers that they look nice but to hot to wear them	1	5	2	3	I don't like it, the fabric feels like scratching my nails on a blackboard
I don't like them, school uniform. Itchy and horrible clothes	3	1	3	5	outside of a coat. I'm not sure what this is. I've never encountered it
clean shirt. Starting a new job. Nervous but excited. Not very comfortable but clean	3	4	3	3	discomfort, comfortable old cushion. Not related to each other, rougher
these are not eliciting any emotional reaction. Similar in one side	5	3	3	4	nice bag, old cushion. It feels comfortable and familiar
these feel itchy, the touch is horrible	5	1	5	3	feels comfortable. I'd have a cushion pillow made of this
comfortable grandmother's sofa	5	2	4	3	it feels more real
they look soft and silky	1	5	1	2	looks rougher
they look like things I'd own	1	5	1	3	too rough, too scratchy
white squares quite hypnotic	1	4	2	4	soft diamonds, smooth look
neat, perfectly,I like the pattern	1	4	2	2	discoloured and ugly
feel like a fabric already worn	5	1	4	2	higer quality
childhood school trip	3	4	3	3	tea towel, boring
makes me think about getting into bed	2	3	2	4	reminds me of receiving a post (nice)
like a school sport day (cold)	3	3	4	4	like a National Trust house
ice-cream cone - trip to grandparents	3	3	3	3	no emotional response
being warm in a very cold place	2	4	2	2	factory tour
soft quality	1	5	1	2	rough quality
summer	2	5	4	4	winter
pride of authorship	2	3	2	2	that is not my creation
I feel emotionally attached with the final creation	2	2	2	2	I have just been involved in the design process
the text helped to load the textile with E.E.	2	3	3	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	4	3	4	the coded pattern did not help at all

Table 7. 93. Participant D - stage three tactile-visual bimodal analysis RGT sheet focus analysis.

Participant E

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT E | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 20.03.2020 | TIME: 12:30 PM | PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
soft, baby blanket that I used to have when I was a kid	1	3	2	3	feels synthetic, quite new, not soft. Reminds me of a university project
material from hotel rooms, cushions (dark blue and red /white)	5	5	3	4	more homely, big green blanket on spare room at home.
reminds me of the bed at home that is nicer and more comfortable that the one here (student halls)	3	3	3	3	I don't like it, itchy clothes
granny's - jumpers and clothes	3	3	2	2	I don't like it as it doesn't feel that nice
Tedy bear at home and the contrast	4	2	1	3	I can't relate it to anything
bath mats, more worn, rough towelly	2	1	3	1	tablecloth, smooth in places
reminds me of mum's scarf and wedding dress outfit texture	3	4	3	4	reminds me of a carpet
reminds me of old bio teacher- pattern colourful (bags and scarves)	3	3	3	3	wedding hat material (looks like)
reminds me of my mum's wedding dress (pattern in material)	3	5	3	3	reusable shopping bag, mum has it
tights textures the ones I own (see through)	4	3	4	4	don't have a connection
reminds me of old bio teacher - scarves, bags and tops - patterned colourful texture	5	3	3	3	reminds me of boring scarves
parents duvet cover - textured and raised	3	3	2	3	reminds me of textile print material from university
Jeans, one that broke and one that I've had it for years	4	3	4	4	it's really soft and nice, it reminds me of home
blue blanket, rough and smooth - very comfortable	2	4	2	1	pillows on conservatory chairs
blue blanket	3	3	1	1	hotel curtains soft and nice
scarves that my mum has, reminds me of her	3	3	3	3	rouched top for everyday, it's black
granny and grandad sofa texture and pattern . It was green	3	1	3	3	reusable shopping bag
sheep pillow I made when I was younger	2	3	2	2	dressing up dress
pride of authorship	5	2	5	3	that is not my creation
I feel emotionally attached with the final creation	4	4	3	5	I have just been involved in the design process
the text helped to load the textile with E.E.	5	5	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	2	3	3	the coded pattern did not help at all

Table 7. 94. Participant E - stage three tactile unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT E	RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐	
DATE: 20.03.2020	TIME: 12:30 PM	PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
soft, baby blanket that I used to have when I was a kid	1	3	2	3	feels synthetic, quite new, not soft. Reminds me of a university project
material from hotel rooms, cushions (dark blue and red /white)	5	5	3	4	more homely, big green blanket on spare room at home.
reminds me of the bed at home that is nicer and more comfortable that the one here (student halls)	3	3	3	3	I don't like it, itchy clothes
granny's - jumpers and clothes	3	3	2	2	I don't like it as it doesn't feel that nice
Tedy bear at home and the contrast	4	2	1	3	I can't relate it to anything
bath mats, more worn, rough towelly	2	1	3	1	tablecloth, smooth in places
reminds me of mum's scarf and wedding dress outfit texture	3	4	3	4	reminds me of a carpet
reminds me of old bio teacher- pattern colourful (bags and scarves)	3	3	3	3	wedding hat material (looks like)
reminds me of my mum's wedding dress (pattern in material)	3	5	3	3	reusable shopping bag, mum has it
tights textures the ones I own (see through)	4	3	4	4	don't have a connection
reminds me of old bio teacher - scarves, bags and tops - patterned colourful texture	5	3	3	3	reminds me of boring scarves
parents duvet cover - textured and raised	3	3	2	3	reminds me of textile print material from university
Jeans, one that broke and one that I've had it for years	4	3	4	4	it's really soft and nice, it reminds me of home
blue blanket, rough and smooth - very comfortable	2	4	2	1	pillows on conservatory chairs
blue blanket	3	3	1	1	hotel curtains soft and nice
scarves that my mum has, reminds me of her	3	3	3	3	rouched top for everyday, it's black
granny and grandad sofa texture and pattern . It was green	3	1	3	3	reusable shopping bag
sheep pillow I made when I was younger	2	3	2	2	dressing up dress
pride of authorship	5	2	5	3	that is not my creation
I feel emotionally attached with the final creation	4	4	3	5	I have just been involved in the design process
the text helped to load the textile with E.E.	5	5	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	2	3	3	the coded pattern did not help at all

Table 7. 95. Participant E - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT E	RGT: TACTILE ☐ VISUAL ■	TACTILE & VISUAL ☐
DATE: 20.03.2020	TIME: 12:30 PM	PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
soft, baby blanket that I used to have when I was a kid	3	3	3	3	feels synthetic, quite new, not soft. Reminds me of a university project
material from hotel rooms, cushions (dark blue and red /white)	4	5	3	5	more homely, big green blanket on spare room at home.
reminds me of the bed at home that is nicer and more comfortable that the one here (student halls)	4	2	4	4	I don't like it, itchy clothes
granny's - jumpers and clothes	3	3	3	2	I don't like it as it doesn't feel that nice
Tedy bear at home and the contrast	3	3	4	3	I can't relate it to anything
bath mats, more worn, rough towelly	1	5	2	1	tablecloth, smooth in places
reminds me of mum's scarf and wedding dress outfit texture	5	1	5	5	reminds me of a carpet
reminds me of old bio teacher- pattern colourful (bags and scarves)	3	3	3	3	wedding hat material (looks like)
reminds me of my mum's wedding dress (pattern in material)	3	1	5	4	reusable shopping bag, mum has it
tights textures the ones I own (see through)	3	4	3	4	don't have a connection
reminds me of old bio teacher - scarves, bags and tops - patterned colourful texture	3	1	3	2	reminds me of boring scarves
parents duvet cover - textured and raised	3	3	2	1	reminds me of textile print material from university
Jeans, one that broke and one that I've had it for years	3	3	3	3	it's really soft and nice, it reminds me of home
blue blanket, rough and smooth - very comfortable	3	3	3	2	pillows on conservatory chairs
blue blanket	2	3	4	2	hotel curtains soft and nice
scarves that my mum has, reminds me of her	3	2	4	2	rouched top for everyday, it's black
granny and grandad sofa texture and pattern . It was green	4	1	4	2	reusable shopping bag
sheep pillow I made when I was younger	2	3	3	3	dressing up dress
pride of authorship	3	4	4	3	that is not my creation
I feel emotionally attached with the final creation	5	5	5	5	I have just been involved in the design process
the text helped to load the textile with E.E.	3	5	4	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	3	3	3	the coded pattern did not help at all

Table 7. 96. Participant E - stage three visual unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT E	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 20.03.2020	TIME: 12:30 PM	PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
soft, baby blanket that I used to have when I was a kid	3	3	3	3	feels synthetic, quite new, not soft. Reminds me of a university project
material from hotel rooms, cushions (dark blue and red /white)	4	5	3	5	more homely, big green blanket on spare room at home.
reminds me of the bed at home that is nicer and more comfortable that the one here (student halls)	4	2	4	4	I don't like it, itchy clothes
granny's - jumpers and clothes	3	3	3	2	I don't like it as it doesn't feel that nice
Tedy bear at home and the contrast	3	3	4	3	I can't relate it to anything
bath mats, more worn, rough towelly	1	5	2	1	tablecloth, smooth in places
reminds me of mum's scarf and wedding dress outfit texture	5	1	5	5	reminds me of a carpet
reminds me of old bio teacher- pattern colourful (bags and scarves)	3	3	3	3	wedding hat material (looks like)
reminds me of my mum's wedding dress (pattern in material)	3	1	5	4	reusable shopping bag, mum has it
tights textures the ones I own (see through)	3	4	3	4	don't have a connection
reminds me of old bio teacher - scarves, bags and tops - patterned colourful texture	3	1	3	2	reminds me of boring scarves
parents duvet cover - textured and raised	3	3	2	1	reminds me of textile print material from university
Jeans, one that broke and one that I've had it for years	3	3	3	3	it's really soft and nice, it reminds me of home
blue blanket, rough and smooth - very comfortable	3	3	3	2	pillows on conservatory chairs
blue blanket	2	3	4	2	hotel curtains soft and nice
scarves that my mum has, reminds me of her	3	2	4	2	rouched top for everyday, it's black
granny and grandad sofa texture and pattern . It was green	4	1	4	2	reusable shopping bag
sheep pillow I made when I was younger	2	3	3	3	dressing up dress
pride of authorship	3	4	4	3	that is not my creation
I feel emotionally attached with the final creation	5	5	5	5	I have just been involved in the design process
the text helped to load the textile with E.E.	3	5	4	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	3	3	3	the coded pattern did not help at all

Table 7. 97. Participant E - stage three visual unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT E	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 20.03.2020	TIME: 12:30 PM	PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
soft, baby blanket that I used to have when I was a kid	1	3	2	1	feels synthetic, quite new, not soft. Reminds me of a university project
material from hotel rooms, cushions (dark blue and red /white)	3	3	3	5	more homely, big green blanket on spare room at home.
reminds me of the bed at home that is nicer and more comfortable that the one here (student halls)	3	4	3	3	I don't like it, itchy clothes
granny's - jumpers and clothes	3	4	2	2	I don't like it as it doesn't feel that nice
Tedy bear at home and the contrast	4	4	2	2	I can't relate it to anything
bath mats, more worn, rough towelly	3	1	2	2	tablecloth, smooth in places
reminds me of mum's scarf and wedding dress outfit texture	2	1	3	3	reminds me of a carpet
reminds me of old bio teacher- pattern colourful (bags and scarves)	2	2	3	2	wedding hat material (looks like)
reminds me of my mum's wedding dress (pattern in material)	4	1	2	3	reusable shopping bag, mum has it
tights textures the ones I own (see through)	4	3	4	3	don't have a connection
reminds me of old bio teacher - scarves, bags and tops - patterned colourful texture	3	3	2	2	reminds me of boring scarves
parents duvet cover - textured and raised	3	2	3	2	reminds me of textile print material from university
Jeans, one that broke and one that I've had it for years	4	3	4	4	it's really soft and nice, it reminds me of home
blue blanket, rough and smooth - very comfortable	4	2	3	2	pillows on conservatory chairs
blue blanket	2	1	2	1	hotel curtains soft and nice
scarves that my mum has, reminds me of her	3	2	2	3	rouched top for everyday, it's black
granny and grandad sofa texture and pattern . It was green	2	1	3	3	reusable shopping bag
sheep pillow I made when I was younger	1	3	1	1	dressing up dress
pride of authorship	5	4	3	4	that is not my creation
I feel emotionally attached with the final creation	5	5	3	5	I have just been involved in the design process
the text helped to load the textile with E.E.	5	5	2	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	5	5	2	the coded pattern did not help at all

Table 7. 98. Participant E - stage three tactile-visual bimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT E | RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■

DATE: 20.03.2020 | TIME: 12:30 PM | PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
soft, baby blanket that I used to have when I was a kid	1	3	2	1	feels synthetic, quite new, not soft. Reminds me of a university project
material from hotel rooms, cushions (dark blue and red /white)	3	3	3	5	more homely, big green blanket on spare room at home.
reminds me of the bed at home that is nicer and more comfortable that the one here (student halls)	3	4	3	3	I don't like it, itchy clothes
granny's - jumpers and clothes	3	4	2	2	I don't like it as it doesn't feel that nice
Tedy bear at home and the contrast	4	4	2	2	I can't relate it to anything
bath mats, more worn, rough towelly	3	1	2	2	tablecloth, smooth in places
reminds me of mum's scarf and wedding dress outfit texture	2	1	3	3	reminds me of a carpet
reminds me of old bio teacher- pattern colourful (bags and scarves)	2	2	3	2	wedding hat material (looks like)
reminds me of my mum's wedding dress (pattern in material)	4	1	2	3	reusable shopping bag, mum has it
tights textures the ones I own (see through)	4	3	4	3	don't have a connection
reminds me of old bio teacher - scarves, bags and tops - patterned colourful texture	3	3	2	2	reminds me of boring scarves
parents duvet cover - textured and raised	3	2	3	2	reminds me of textile print material from university
Jeans, one that broke and one that I've had it for years	4	3	4	4	it's really soft and nice, it reminds me of home
blue blanket, rough and smooth - very comfortable	4	2	3	2	pillows on conservatory chairs
blue blanket	2	1	2	1	hotel curtains soft and nice
scarves that my mum has, reminds me of her	3	2	2	3	rouched top for everyday, it's black
granny and grandad sofa texture and pattern . It was green	2	1	3	3	reusable shopping bag
sheep pillow I made when I was younger	1	3	1	1	dressing up dress
pride of authorship	5	4	3	4	that is not my creation
I feel emotionally attached with the final creation	5	5	3	5	I have just been involved in the design process
the text helped to load the textile with E.E.	5	5	2	3	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	5	5	2	the coded pattern did not help at all

Table 7. 99. Participant E - stage three tactile-visual bimodal analysis RGT sheet focus analysis.

Participant F

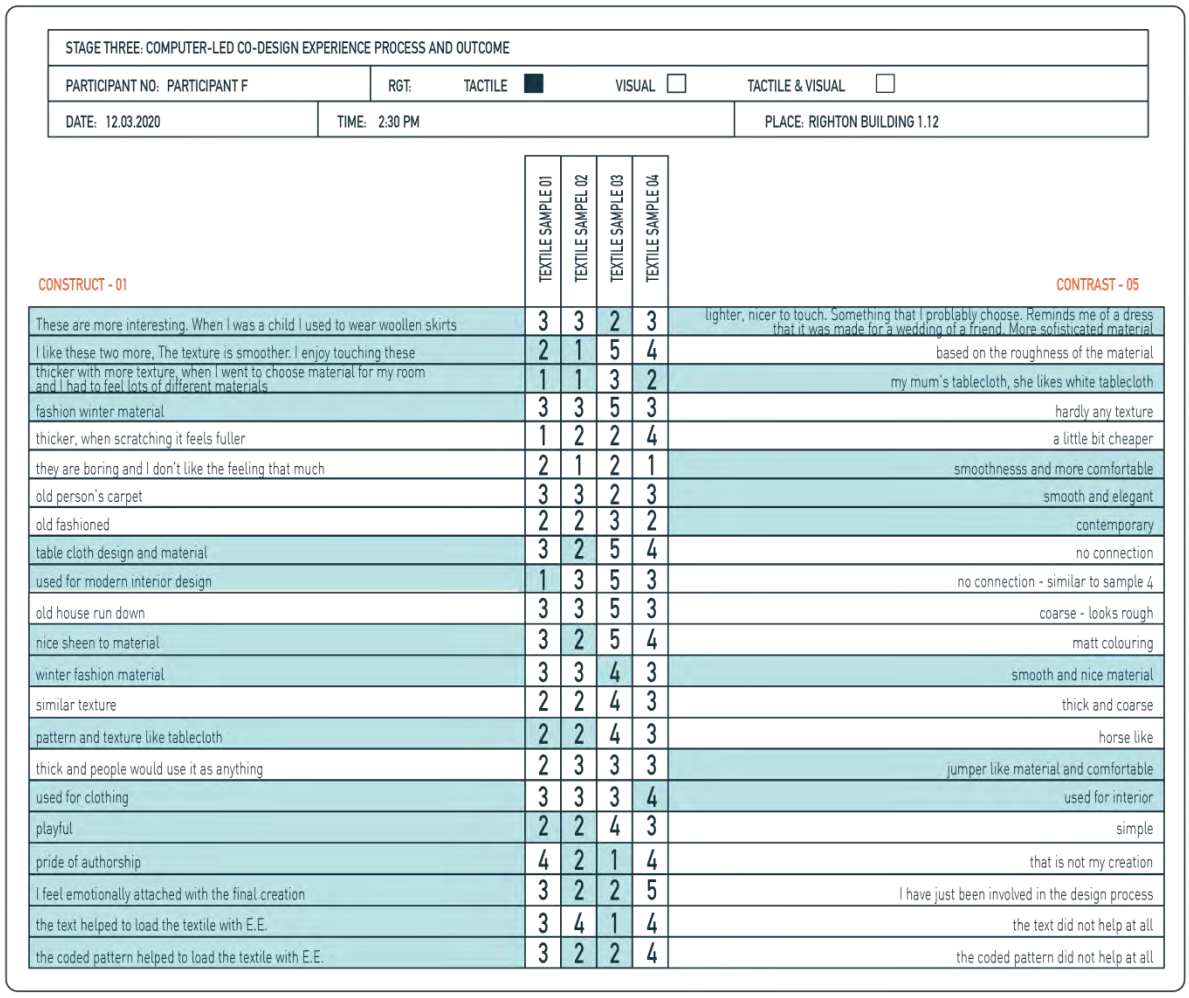
STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT F | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 12.03.2020 | TIME: 2:30 PM | PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPEL 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
These are more interesting. When I was a child I used to wear woollen skirts	3	3	2	3	lighter, nicer to touch. Something that I problably choose. Reminds me of a dress that it was made for a wedding of a friend. More sofisticated material
I like these two more, The texture is smoother. I enjoy touching these	2	1	5	4	based on the roughness of the material
thicker with more texture, when I went to choose material for my room and I had to feel lots of different materials	1	1	3	2	my mum's tablecloth, she likes white tablecloth
fashion winter material	3	3	5	3	hardly any texture
thicker, when scratching it feels fuller	1	2	2	4	a little bit cheaper
they are boring and I don't like the feeling that much	2	1	2	1	smoothnesss and more comfortable
old person's carpet	3	3	2	3	smooth and elegant
old fashioned	2	2	3	2	contemporary
table cloth design and material	3	2	5	4	no connection
used for modern interior design	1	3	5	3	no connection - similar to sample 4
old house run down	3	3	5	3	coarse - looks rough
nice sheen to material	3	2	5	4	matt colouring
winter fashion material	3	3	4	3	smooth and nice material
similar texture	2	2	4	3	thick and coarse
pattern and texture like tablecloth	2	2	4	3	horse like
thick and people would use it as anything	2	3	3	3	jumper like material and comfortable
used for clothing	3	3	3	4	used for interior
playful	2	2	4	3	simple
pride of authorship	4	2	1	4	that is not my creation
I feel emotionally attached with the final creation	3	2	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	3	4	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	2	2	4	the coded pattern did not help at all

Table 7. 100. Participant F - stage three tactile unimodal analysis RGT sheet.



STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT F | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 12.03.2020 | TIME: 2:30 PM | PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPEL 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
These are more interesting. When I was a child I used to wear woollen skirts	3	3	2	3	lighter, nicer to touch. Something that I problably choose. Reminds me of a dress that it was made for a wedding of a friend. More sofisticated material
I like these two more, The texture is smoother. I enjoy touching these	2	1	5	4	based on the roughness of the material
thicker with more texture, when I went to choose material for my room and I had to feel lots of different materials	1	1	3	2	my mum's tablecloth, she likes white tablecloth
fashion winter material	3	3	5	3	hardly any texture
thicker, when scratching it feels fuller	1	2	2	4	a little bit cheaper
they are boring and I don't like the feeling that much	2	1	2	1	smoothnesss and more comfortable
old person's carpet	3	3	2	3	smooth and elegant
old fashioned	2	2	3	2	contemporary
table cloth design and material	3	2	5	4	no connection
used for modern interior design	1	3	5	3	no connection - similar to sample 4
old house run down	3	3	5	3	coarse - looks rough
nice sheen to material	3	2	5	4	matt colouring
winter fashion material	3	3	4	3	smooth and nice material
similar texture	2	2	4	3	thick and coarse
pattern and texture like tablecloth	2	2	4	3	horse like
thick and people would use it as anything	2	3	3	3	jumper like material and comfortable
used for clothing	3	3	3	4	used for interior
playful	2	2	4	3	simple
pride of authorship	4	2	1	4	that is not my creation
I feel emotionally attached with the final creation	3	2	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	3	4	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	2	2	4	the coded pattern did not help at all

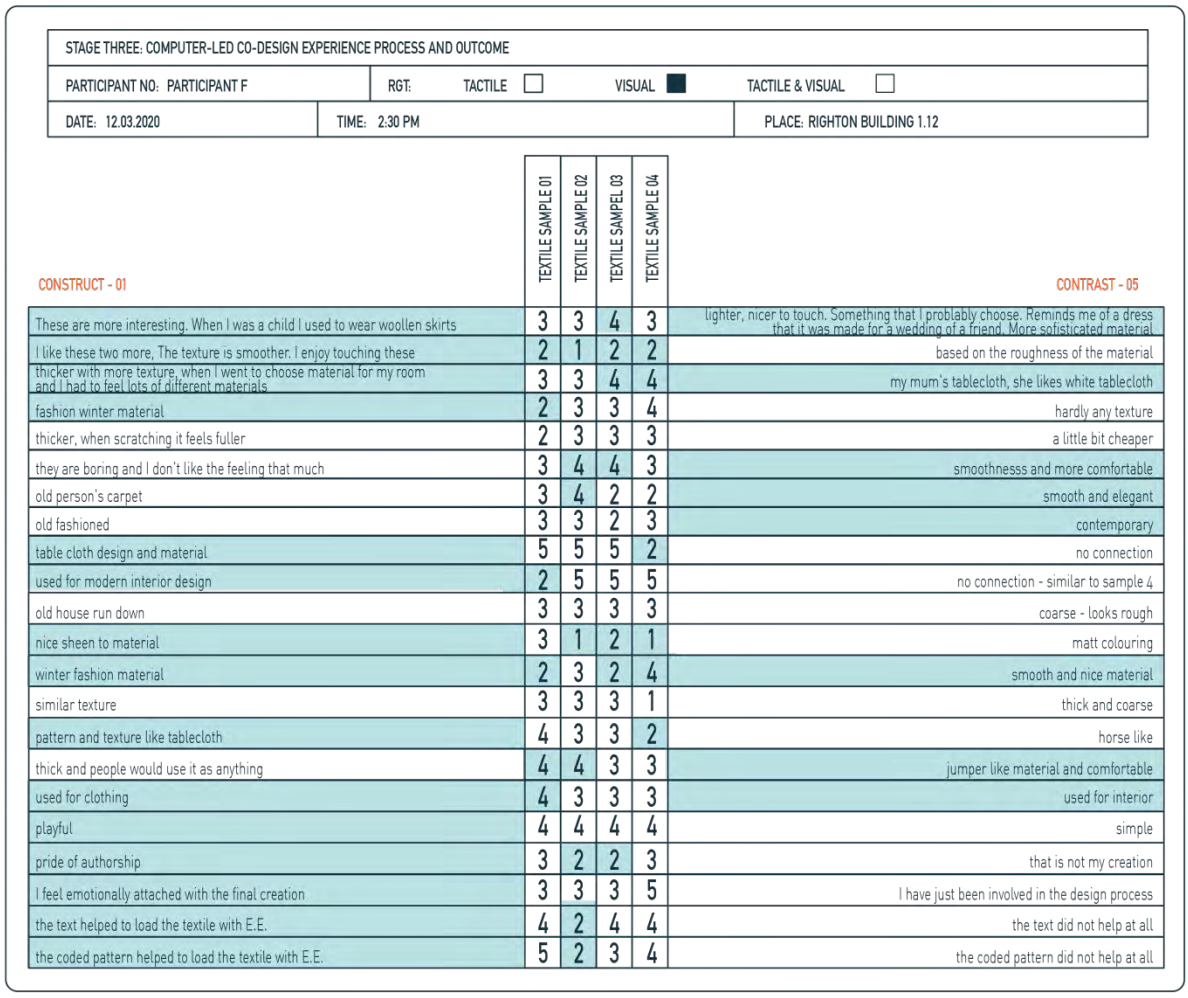
Table 7. 101. Participant F - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT F	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 12.03.2020	TIME: 2:30 PM	PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPEL 03	TEXTILE SAMPLE 04	CONTRAST - 05
These are more interesting. When I was a child I used to wear woollen skirts	3	3	4	3	lighter, nicer to touch. Something that I problably choose. Reminds me of a dress that it was made for a wedding of a friend. More sofisticated material
I like these two more, The texture is smoother. I enjoy touching these	2	1	2	2	based on the roughness of the material
thicker with more texture, when I went to choose material for my room and I had to feel lots of different materials	3	3	4	4	my mum's tablecloth, she likes white tablecloth
fashion winter material	2	3	3	4	hardly any texture
thicker, when scratching it feels fuller	2	3	3	3	a little bit cheaper
they are boring and I don't like the feeling that much	3	4	4	3	smoothnesss and more comfortable
old person's carpet	3	4	2	2	smooth and elegant
old fashioned	3	3	2	3	contemporary
table cloth design and material	5	5	5	2	no connection
used for modern interior design	2	5	5	5	no connection - similar to sample 4
old house run down	3	3	3	3	coarse - looks rough
nice sheen to material	3	1	2	1	matt colouring
winter fashion material	2	3	2	4	smooth and nice material
similar texture	3	3	3	1	thick and coarse
pattern and texture like tablecloth	4	3	3	2	horse like
thick and people would use it as anything	4	4	3	3	jumper like material and comfortable
used for clothing	4	3	3	3	used for interior
playful	4	4	4	4	simple
pride of authorship	3	2	2	3	that is not my creation
I feel emotionally attached with the final creation	3	3	3	5	I have just been involved in the design process
the text helped to load the textile with E.E.	4	2	4	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	5	2	3	4	the coded pattern did not help at all

Table 7. 102. Participant F - stage three visual unimodal analysis RGT sheet.



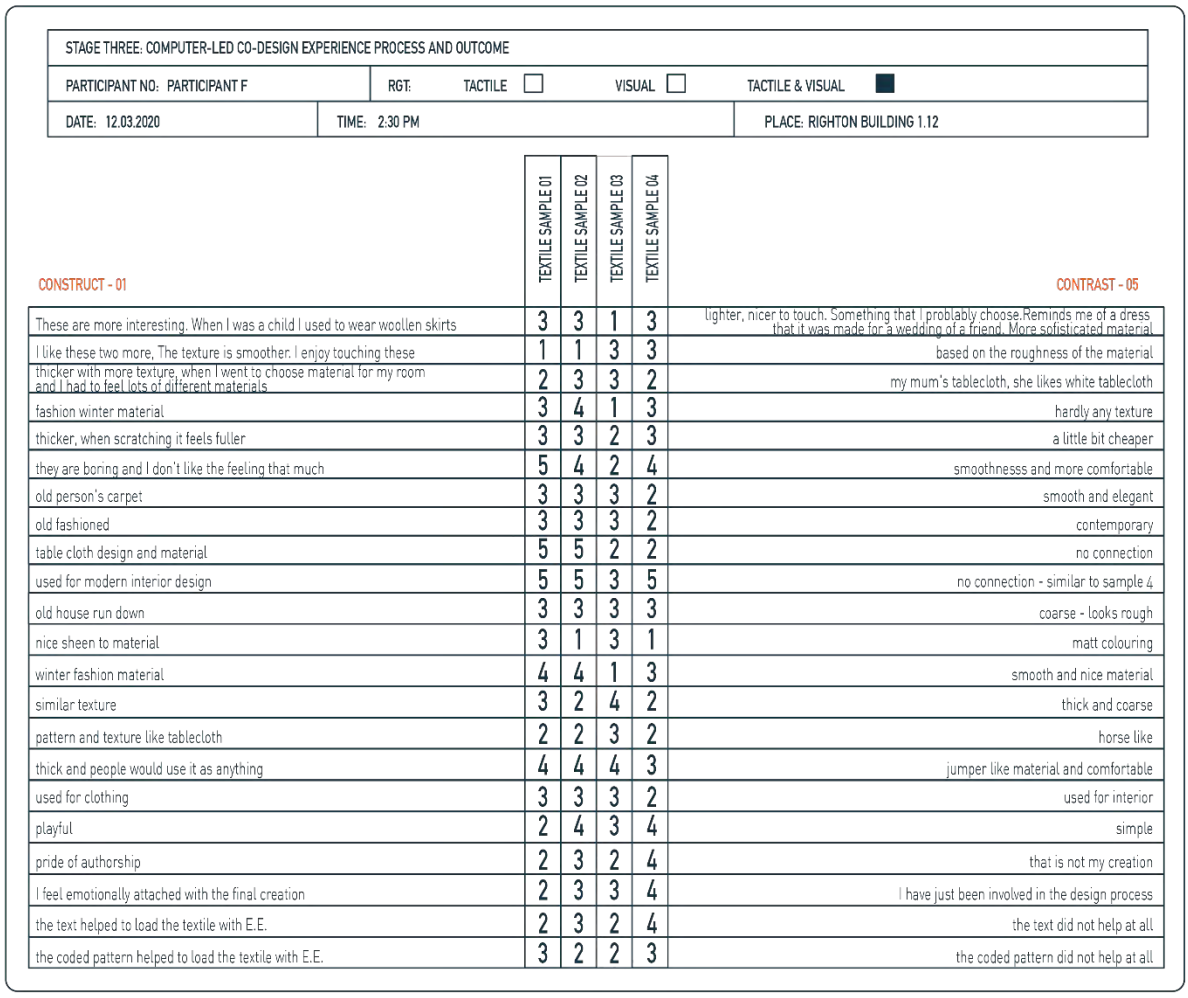
STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT F | RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐

DATE: 12.03.2020 | TIME: 2:30 PM | PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPEL 03	TEXTILE SAMPLE 04	CONTRAST - 05
These are more interesting. When I was a child I used to wear woollen skirts	3	3	4	3	lighter, nicer to touch. Something that I problably choose. Reminds me of a dress that it was made for a wedding of a friend. More sofisticated material
I like these two more, The texture is smoother. I enjoy touching these	2	1	2	2	based on the roughness of the material
thicker with more texture, when I went to choose material for my room and I had to feel lots of different materials	3	3	4	4	my mum's tablecloth, she likes white tablecloth
fashion winter material	2	3	3	4	hardly any texture
thicker, when scratching it feels fuller	2	3	3	3	a little bit cheaper
they are boring and I don't like the feeling that much	3	4	4	3	smoothnesss and more comfortable
old person's carpet	3	4	2	2	smooth and elegant
old fashioned	3	3	2	3	contemporary
table cloth design and material	5	5	5	2	no connection
used for modern interior design	2	5	5	5	no connection - similar to sample 4
old house run down	3	3	3	3	coarse - looks rough
nice sheen to material	3	1	2	1	matt colouring
winter fashion material	2	3	2	4	smooth and nice material
similar texture	3	3	3	1	thick and coarse
pattern and texture like tablecloth	4	3	3	2	horse like
thick and people would use it as anything	4	4	3	3	jumper like material and comfortable
used for clothing	4	3	3	3	used for interior
playful	4	4	4	4	simple
pride of authorship	3	2	2	3	that is not my creation
I feel emotionally attached with the final creation	3	3	3	5	I have just been involved in the design process
the text helped to load the textile with E.E.	4	2	4	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	5	2	3	4	the coded pattern did not help at all

Table 7. 103. Participant F - stage three visual unimodal analysis RGT sheet focus analysis.



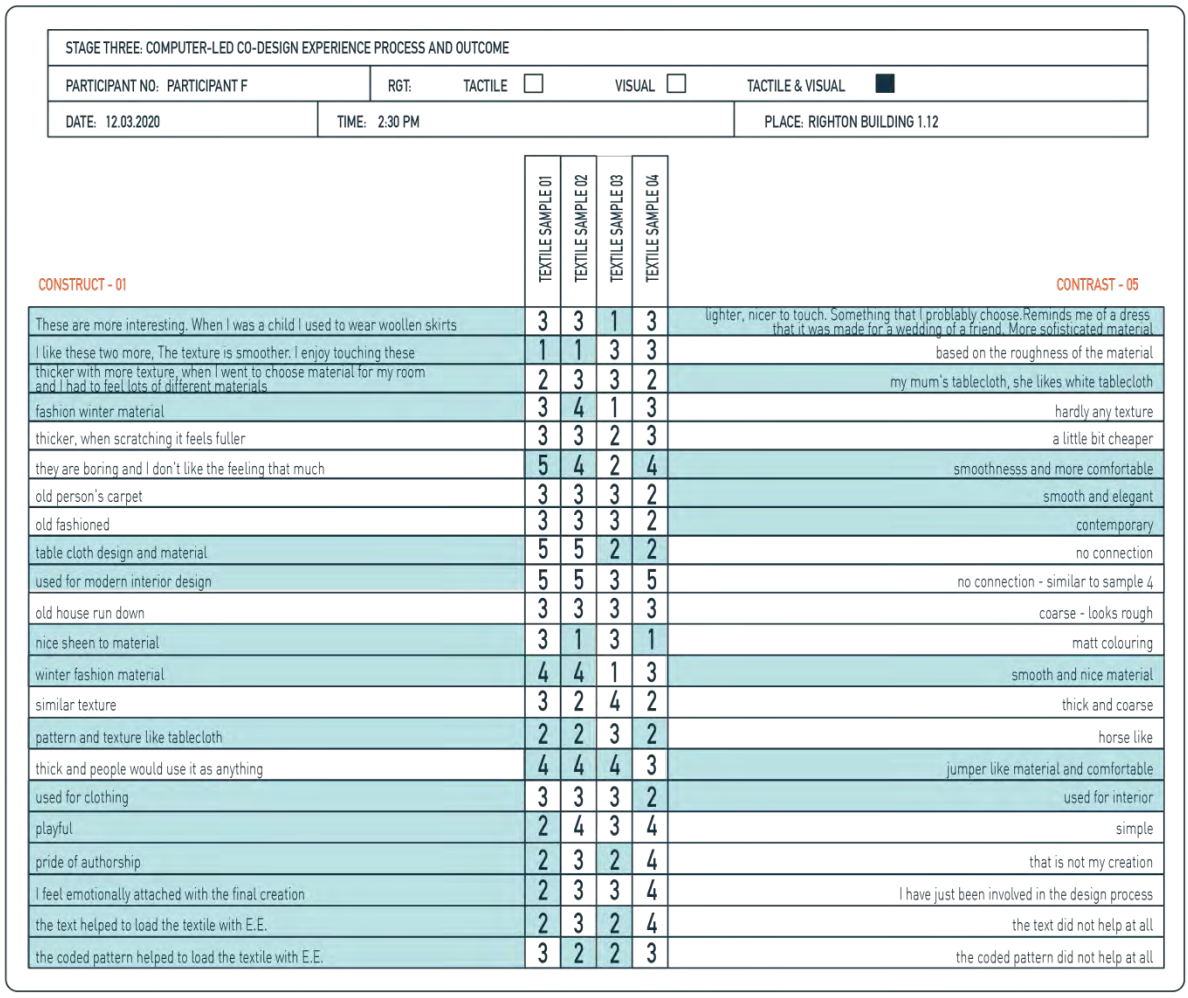
STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT F | RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■

DATE: 12.03.2020 | TIME: 2:30 PM | PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
These are more interesting. When I was a child I used to wear woollen skirts	3	3	1	3	lighter, nicer to touch. Something that I problably choose.Reminds me of a dress that it was made for a wedding of a friend. More sofisticated material
I like these two more, The texture is smoother. I enjoy touching these	1	1	3	3	based on the roughness of the material
thicker with more texture, when I went to choose material for my room and I had to feel lots of different materials	2	3	3	2	my mum's tablecloth, she likes white tablecloth
fashion winter material	3	4	1	3	hardly any texture
thicker, when scratching it feels fuller	3	3	2	3	a little bit cheaper
they are boring and I don't like the feeling that much	5	4	2	4	smoothnesss and more comfortable
old person's carpet	3	3	3	2	smooth and elegant
old fashioned	3	3	3	2	contemporary
table cloth design and material	5	5	2	2	no connection
used for modern interior design	5	5	3	5	no connection - similar to sample 4
old house run down	3	3	3	3	coarse - looks rough
nice sheen to material	3	1	3	1	matt colouring
winter fashion material	4	4	1	3	smooth and nice material
similar texture	3	2	4	2	thick and coarse
pattern and texture like tablecloth	2	2	3	2	horse like
thick and people would use it as anything	4	4	4	3	jumper like material and comfortable
used for clothing	3	3	3	2	used for interior
playful	2	4	3	4	simple
pride of authorship	2	3	2	4	that is not my creation
I feel emotionally attached with the final creation	2	3	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	3	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	2	2	3	the coded pattern did not help at all

Table 7. 104. Participant F - stage three tactile-visual bimodal analysis RGT sheet.



STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT F | RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■

DATE: 12.03.2020 | TIME: 2:30 PM | PLACE: RIGHTON BUILDING 1.12

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
These are more interesting. When I was a child I used to wear woollen skirts	3	3	1	3	lighter, nicer to touch. Something that I problably choose.Reminds me of a dress that it was made for a wedding of a friend. More sofisticated material
I like these two more, The texture is smoother. I enjoy touching these	1	1	3	3	based on the roughness of the material
thicker with more texture, when I went to choose material for my room and I had to feel lots of different materials	2	3	3	2	my mum's tablecloth, she likes white tablecloth
fashion winter material	3	4	1	3	hardly any texture
thicker, when scratching it feels fuller	3	3	2	3	a little bit cheaper
they are boring and I don't like the feeling that much	5	4	2	4	smoothnesss and more comfortable
old person's carpet	3	3	3	2	smooth and elegant
old fashioned	3	3	3	2	contemporary
table cloth design and material	5	5	2	2	no connection
used for modern interior design	5	5	3	5	no connection - similar to sample 4
old house run down	3	3	3	3	coarse - looks rough
nice sheen to material	3	1	3	1	matt colouring
winter fashion material	4	4	1	3	smooth and nice material
similar texture	3	2	4	2	thick and coarse
pattern and texture like tablecloth	2	2	3	2	horse like
thick and people would use it as anything	4	4	4	3	jumper like material and comfortable
used for clothing	3	3	3	2	used for interior
playful	2	4	3	4	simple
pride of authorship	2	3	2	4	that is not my creation
I feel emotionally attached with the final creation	2	3	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	3	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	3	2	2	3	the coded pattern did not help at all

Table 7. 105. Participant F - stage three tactile-visual bimodal analysis RGT sheet.

Participant G

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT G | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 13.03.2020 | TIME: 2:30 PM | PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
familiar to me	1	1	1	4	I don't recognise it in any context. I don't feel related to it
common place	5	4	4	2	different texture in each side
they feel clothing. I'd wear them. More fluid	1	4	1	5	stiff - not comfortable
feel nicer and cozy. Comforting	3	3	1	4	it's too much - my dad used to dress me with stiffer materials
I don't like them that much, roughness	5	4	5	1	a party shinny classy, dress wearing it. Nice experience
pink cord tousers. Really soft - never fit me well - old but something that I like	2	1	1	4	old lady colours - dark green/mustard. Not related to it
made some winter furnishings	5	3	5	1	silky festive party
texture, colour, fine	4	4	4	5	thick, farmhouse, heavy
fancy, expensive	1	1	1	5	hessian shopping bag. ordinary
beautiful	1	1	1	5	ordinary, thick nomadic rug
regal	1	5	1	3	soft, expensive, home furnishing
thick winter warmers	2	1	2	1	summer picnic, practical and thin
expensive and cosy	1	1	1	5	common place
rigid and uncomfortable	5	3	3	1	soft and beautiful
Christmas party	1	1	4	4	summer picnic
finer , more precious	1	4	1	4	soft and homely
morning and granny	4	3	3	2	evening and granny
expensive, fine, female, clingy	1	3	3	4	good quality, winter, male, scarf
pride of authorship	2	1	4	4	that is not my creation
I feel emotionally attached with the final creation	1	2	1	4	I have just been involved in the design process
the text helped to load the textile with E.E.	1	1	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	3	5	3	the coded pattern did not help at all

Table 7. 106. Participant G - stage three tactile unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME			
PARTICIPANT NO: PARTICIPANT G	RGT: TACTILE ■	VISUAL ☐	TACTILE & VISUAL ☐
DATE: 13.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314	

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
familiar to me	1	1	1	4	I don't recognise it in any context. I don't feel related to it
common place	5	4	4	2	different texture in each side
they feel clothing. I'd wear them. More fluid	1	4	1	5	stiff - not comfortable
feel nicer and cozy. Comforting	3	3	1	4	it's too much - my dad used to dress me with stiffer materials
I don't like them that much, roughness	5	4	5	1	a party shinny classy, dress wearing it. Nice experience
pink cord tousers. Really soft - never fit me well - old but something that I like	2	1	1	4	old lady colours - dark green/mustard. Not related to it
made some winter furnishings	5	3	5	1	silky festive party
texture, colour, fine	4	4	4	5	thick, farmhouse, heavy
fancy, expensive	1	1	1	5	hessian shopping bag. ordinary
beautiful	1	1	1	5	ordinary, thick nomadic rug
regal	1	5	1	3	soft, expensive, home furnishing
thick winter warmers	2	1	2	1	summer picnic, practical and thin
expensive and cosy	1	1	1	5	common place
rigid and uncomfortable	5	3	3	1	soft and beautiful
Christmas party	1	1	4	4	summer picnic
finer , more precious	1	4	1	4	soft and homely
morning and granny	4	3	3	2	evening and granny
expensive, fine, female, clingy	1	3	3	4	good quality, winter, male, scarf
pride of authorship	2	1	4	4	that is not my creation
I feel emotionally attached with the final creation	1	2	1	4	I have just been involved in the design process
the text helped to load the textile with E.E.	1	1	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	3	5	3	the coded pattern did not help at all

Table 7. 107. Participant G - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT G	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 13.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
familiar to me	2	2	2	4	I don't recognise it in any context. I don't feel related to it
common place	3	2	5	4	different texture in each side
they feel clothing. I'd wear them. More fluid	3	4	1	5	stiff - not comfortable
feel nicer and cozy. Comforting	2	4	1	5	it's too much - my dad used to dress me with stiffer materials
I don't like them that much, roughness	4	3	3	1	a party shinny classy, dress wearing it. Nice experience
pink cord tousers. Really soft - never fit me well - old but something that I like	1	1	2	4	old lady colours - dark green/mustard. Not related to it
made some winter furnishings	4	1	2	2	silky festive party
texture, colour, fine	3	4	2	5	thick, farmhouse, heavy
fancy, expensive	1	3	1	4	hessian shopping bag. ordinary
beautiful	2	5	2	4	ordinary, thick nomadic rug
regal	2	4	2	3	soft, expensive, home furnishing
thick winter warmers	2	1	3	2	summer picnic, practical and thin
expensive and cosy	1	1	2	3	common place
rigid and uncomfortable	5	3	4	2	soft and beautiful
Christmas party	1	3	1	3	summer picnic
finer , more precious	1	4	2	3	soft and homely
morning and granny	3	3	5	3	evening and granny
expensive, fine, female, clingy	2	4	3	4	good quality, winter, male, scarf
pride of authorship	2	1	3	5	that is not my creation
I feel emotionally attached with the final creation	4	2	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	1	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	3	2	4	the coded pattern did not help at all

Table 7. 108. Participant G - stage three visual unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT G	RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐	
DATE: 13.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
familiar to me	2	2	2	4	I don't recognise it in any context. I don't feel related to it
common place	3	2	5	4	different texture in each side
they feel clothing. I'd wear them. More fluid	3	4	1	5	stiff - not comfortable
feel nicer and cozy. Comforting	2	4	1	5	it's too much - my dad used to dress me with stiffer materials
I don't like them that much, roughness	4	3	3	1	a party shinny classy, dress wearing it. Nice experience
pink cord tousers. Really soft - never fit me well - old but something that I like	1	1	2	4	old lady colours - dark green/mustard. Not related to it
made some winter furnishings	4	1	2	2	silky festive party
texture, colour, fine	3	4	2	5	thick, farmhouse, heavy
fancy, expensive	1	3	1	4	hessian shopping bag. ordinary
beautiful	2	5	2	4	ordinary, thick nomadic rug
regal	2	4	2	3	soft, expensive, home furnishing
thick winter warmers	2	1	3	2	summer picnic, practical and thin
expensive and cosy	1	1	2	3	common place
rigid and uncomfortable	5	3	4	2	soft and beautiful
Christmas party	1	3	1	3	summer picnic
finer , more precious	1	4	2	3	soft and homely
morning and granny	3	3	5	3	evening and granny
expensive, fine, female, clingy	2	4	3	4	good quality, winter, male, scarf
pride of authorship	2	1	3	5	that is not my creation
I feel emotionally attached with the final creation	4	2	2	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	1	1	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	3	2	4	the coded pattern did not help at all

Table 7. 109. Participant G - stage three visual unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT G	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 13.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
familiar to me	2	2	2	4	I don't recognise it in any context. I don't feel related to it
common place	5	1	5	5	different texture in each side
they feel clothing. I'd wear them. More fluid	2	4	1	5	stiff - not comfortable
feel nicer and cozy. Comforting	1	5	1	4	it's too much - my dad used to dress me with stiffer materials
I don't like them that much, roughness	4	2	3	2	a party shinny classy, dress wearing it. Nice experience
pink cord tousers. Really soft - never fit me well - old but something that I like	1	1	1	4	old lady colours - dark green/mustard. Not related to it
made some winter furnishings	2	1	4	1	silky festive party
texture, colour, fine	4	4	2	5	thick, farmhouse, heavy
fancy, expensive	1	3	2	3	hessian shopping bag. ordinary
beautiful	1	5	2	5	ordinary, thick nomadic rug
regal	1	5	1	4	soft, expensive, home furnishing
thick winter warmers	3	3	2	2	summer picnic, practical and thin
expensive and cosy	1	3	1	4	common place
rigid and uncomfortable	4	3	4	1	soft and beautiful
Christmas party	4	3	4	3	summer picnic
finer , more precious	2	3	4	4	soft and homely
morning and granny	4	3	3	2	evening and granny
expensive, fine, female, clingy	3	4	3	3	good quality, winter, male, scarf
pride of authorship	2	1	2	4	that is not my creation
I feel emotionally attached with the final creation	3	1	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	2	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	4	3	5	the coded pattern did not help at all

Table 7. 110. Participant G - stage three tactile-visual bimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT G	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 13.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
familiar to me	2	2	2	4	I don't recognise it in any context. I don't feel related to it
common place	5	1	5	5	different texture in each side
they feel clothing. I'd wear them. More fluid	2	4	1	5	stiff - not comfortable
feel nicer and cozy. Comforting	1	5	1	4	it's too much - my dad used to dress me with stiffer materials
I don't like them that much, roughness	4	2	3	2	a party shinny classy, dress wearing it. Nice experience
pink cord tousers. Really soft - never fit me well - old but something that I like	1	1	1	4	old lady colours - dark green/mustard. Not related to it
made some winter furnishings	2	1	4	1	silky festive party
texture, colour, fine	4	4	2	5	thick, farmhouse, heavy
fancy, expensive	1	3	2	3	hessian shopping bag. ordinary
beautiful	1	5	2	5	ordinary, thick nomadic rug
regal	1	5	1	4	soft, expensive, home furnishing
thick winter warmers	3	3	2	2	summer picnic, practical and thin
expensive and cosy	1	3	1	4	common place
rigid and uncomfortable	4	3	4	1	soft and beautiful
Christmas party	4	3	4	3	summer picnic
finer , more precious	2	3	4	4	soft and homely
morning and granny	4	3	3	2	evening and granny
expensive, fine, female, clingy	3	4	3	3	good quality, winter, male, scarf
pride of authorship	2	1	2	4	that is not my creation
I feel emotionally attached with the final creation	3	1	1	5	I have just been involved in the design process
the text helped to load the textile with E.E.	1	2	1	5	the text did not help at all
the coded pattern helped to load the textile with E.E.	1	4	3	5	the coded pattern did not help at all

Table 7. 111. Participant G - stage three tactile-tactile bimodal analysis RGT sheet focus analysis.

Participant H

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT H	RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐	
DATE: 20.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
feel similar -texture wise. It feels like the sofa	5	2	2	3	cushion on top of the sofa
I'd rather lay on them, touching my skin	1	1	4	5	texture and experience of a rug from my mum's house. I wouldn't lay on it
based on the fact that I'd actually wear them	2	4	4	5	Trousers that I bought, I didn't like them and sent them back. I'd like to wear that matt
they feel similar, they should be together. Positive and negative as you don't want too much of the same thing, too boring	2	4	2	1	I'd remove the mistress, not because she doesn't belong there
I don't like the scratchiness of it. Negative feeling on my skin	4	4	2	1	feels softer, I'd have it on my skin
feels nice in one side. Cushions that mum got, green ones, mixed textures. It feels like that. Square cushion	2	4	2	5	feels scratchy, rug. Furniture from mum's house, new and old mixture of fabrics
lieing, look to side	2	2	4	4	old, flat, truth
layers, hidden, not transparent	2	2	2	5	transparent, same both sides, no layers
redjimented, structed, square	3	2	2	2	faker, loose, free
not lost, clear, transparent, structure, obvious	2	2	2	2	expensive, lost, not obvious, can be independent
independent, separate, can be alone	4	4	4	4	relient on other two
loose, more movement, textured. There is more of a conversation within the matiral in it's parts	3	2	4	4	tight, strached, flat, not much conversation going on
similarity in surface, the back is the same	5	5	4	1	different, different back
look different, feel the same, not expected	3	3	3	3	looks the same, feels different
structed, square, soft	2	2	4	4	scracthy, flat, boring
movement, interaction, feedback	2	2	4	4	not movement, not feedback, more 'one level'
repreated, same, boring	1	3	1	1	unexpected, hidden, reveal
addictive, feedback, interaction from fabric	3	3	4	4	flat, not feedback, no fabric interaction
pride of authorship	3	3	4	4	that is not my creation
I feel emotionally attached with the final creation	2	4	4	5	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	2	2	4	the coded pattern did not help at all

Table 7. 112. Participant H - stage three tactile unimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT H | RGT: TACTILE ■ VISUAL ☐ TACTILE & VISUAL ☐

DATE: 20.03.2020 | TIME: 2:30 PM | PLACE: BENZIE BUILDING BZ314

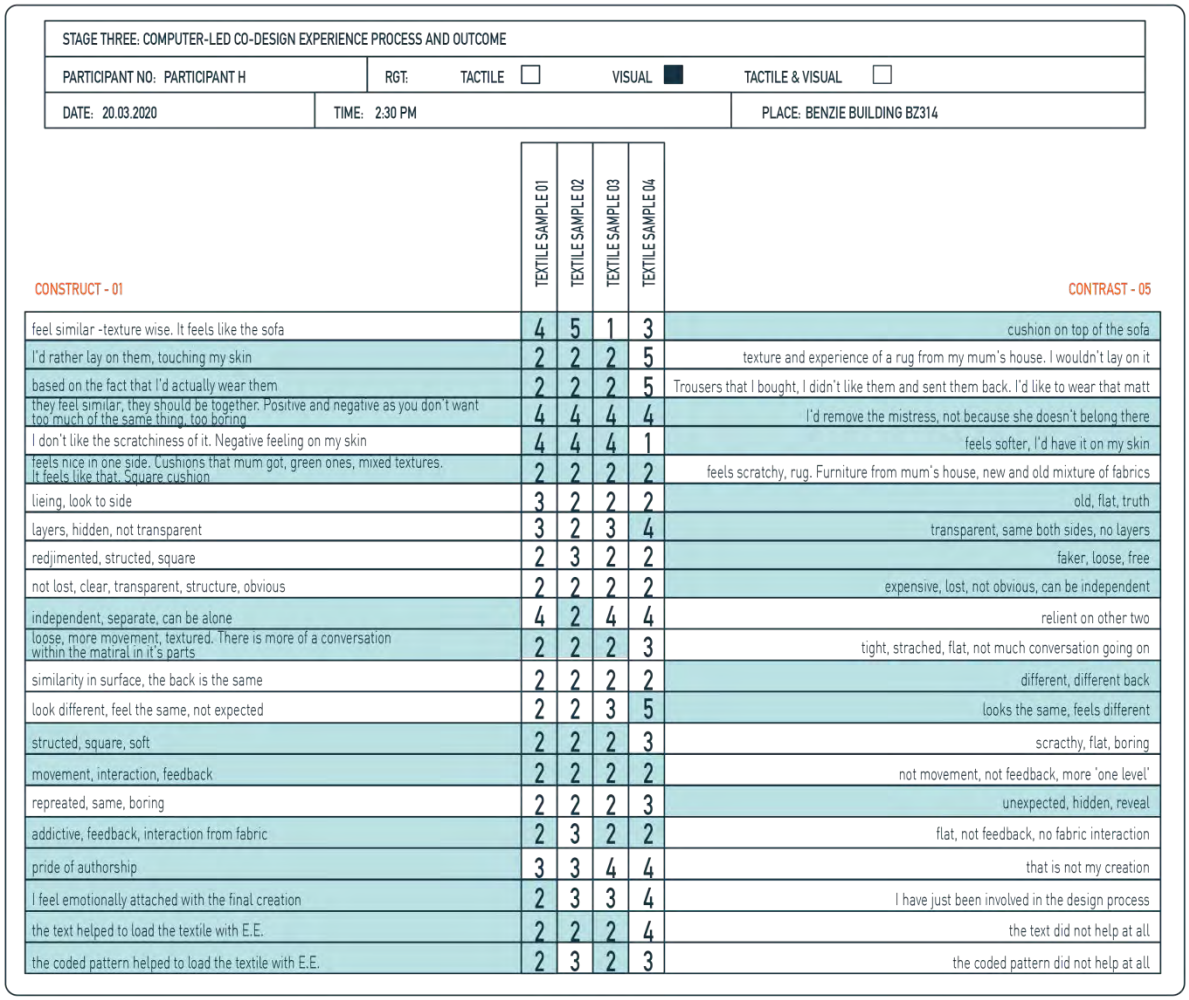
CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
feel similar -texture wise. It feels like the sofa	5	2	2	3	cushion on top of the sofa
I'd rather lay on them, touching my skin	1	1	4	5	texture and experience of a rug from my mum's house. I wouldn't lay on it
based on the fact that I'd actually wear them	2	4	4	5	Trousers that I bought, I didn't like them and sent them back. I'd like to wear that matt
they feel similar, they should be together. Positive and negative as you don't want too much of the same thing. too boring	2	4	2	1	I'd remove the mistress, not because she doesn't belong there
I don't like the scratchiness of it. Negative feeling on my skin	4	4	2	1	feels softer, I'd have it on my skin
feels nice in one side. Cushions that mum got, green ones, mixed textures. it feels like that. Square cushion	2	4	2	5	feels scratchy, rug. Furniture from mum's house, new and old mixture of fabrics
lieing, look to side	2	2	4	4	old, flat, truth
layers, hidden, not transparent	2	2	2	5	transparent, same both sides, no layers
redjimented, structed, square	3	2	2	2	faker, loose, free
not lost, clear, transparent, structure, obvious	2	2	2	2	expensive, lost, not obvious, can be independent
independent, separate, can be alone	4	4	4	4	relient on other two
loose, more movement, textured. There is more of a conversation within the matiral in it's parts	3	2	4	4	tight, strached, flat, not much conversation going on
similarity in surface, the back is the same	5	5	4	1	different, different back
look different, feel the same, not expected	3	3	3	3	looks the same, feels different
structed, square, soft	2	2	4	4	scracthy, flat, boring
movement, interaction, feedback	2	2	4	4	not movement, not feedback, more 'one level'
repreated, same, boring	1	3	1	1	unexpected, hidden, reveal
addictive, feedback, interaction from fabric	3	3	4	4	flat, not feedback, no fabric interaction
pride of authorship	3	3	4	4	that is not my creation
I feel emotionally attached with the final creation	2	4	4	5	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	4	2	2	4	the coded pattern did not help at all

Table 7. 113. Participant H - stage three tactile unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME			
PARTICIPANT NO: PARTICIPANT H	RGT: TACTILE ☐	VISUAL ■	TACTILE & VISUAL ☐
DATE: 20.03.2020	TIME: 2:30 PM		PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
feel similar -texture wise. It feels like the sofa	4	5	1	3	cushion on top of the sofa
I'd rather lay on them, touching my skin	2	2	2	5	texture and experience of a rug from my mum's house. I wouldn't lay on it
based on the fact that I'd actually wear them	2	2	2	5	Trousers that I bought, I didn't like them and sent them back. I'd like to wear that matt
they feel similar, they should be together. Positive and negative as you don't want too much of the same thing, too boring	4	4	4	4	I'd remove the mistress, not because she doesn't belong there
I don't like the scratchiness of it. Negative feeling on my skin	4	4	4	1	feels softer, I'd have it on my skin
feels nice in one side. Cushions that mum got, green ones, mixed textures. It feels like that. Square cushion	2	2	2	2	feels scratchy, rug. Furniture from mum's house, new and old mixture of fabrics
lieing, look to side	3	2	2	2	old, flat, truth
layers, hidden, not transparent	3	2	3	4	transparent, same both sides, no layers
redjimented, structed, square	2	3	2	2	faker, loose, free
not lost, clear, transparent, structure, obvious	2	2	2	2	expensive, lost, not obvious, can be independent
independent, separate, can be alone	4	2	4	4	relient on other two
loose, more movement, textured. There is more of a conversation within the matiral in it's parts	2	2	2	3	tight, strached, flat, not much conversation going on
similarity in surface, the back is the same	2	2	2	2	different, different back
look different, feel the same, not expected	2	2	3	5	looks the same, feels different
structed, square, soft	2	2	2	3	scracthy, flat, boring
movement, interaction, feedback	2	2	2	2	not movement, not feedback, more 'one level'
repreated, same, boring	2	2	2	3	unexpected, hidden, reveal
addictive, feedback, interaction from fabric	2	3	2	2	flat, not feedback, no fabric interaction
pride of authorship	3	3	4	4	that is not my creation
I feel emotionally attached with the final creation	2	3	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	2	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	2	3	2	3	the coded pattern did not help at all

Table 7. 114. Participant H - stage three visual unimodal analysis RGT sheet.



STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT H | RGT: TACTILE ☐ VISUAL ■ TACTILE & VISUAL ☐

DATE: 20.03.2020 | TIME: 2:30 PM | PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
feel similar -texture wise. It feels like the sofa	4	5	1	3	cushion on top of the sofa
I'd rather lay on them, touching my skin	2	2	2	5	texture and experience of a rug from my mum's house. I wouldn't lay on it
based on the fact that I'd actually wear them	2	2	2	5	Trousers that I bought, I didn't like them and sent them back. I'd like to wear that matt
they feel similar, they should be together. Positive and negative as you don't want too much of the same thing, too boring	4	4	4	4	I'd remove the mistress, not because she doesn't belong there
I don't like the scratchiness of it. Negative feeling on my skin	4	4	4	1	feels softer, I'd have it on my skin
feels nice in one side. Cushions that mum got, green ones, mixed textures. It feels like that. Square cushion	2	2	2	2	feels scratchy, rug. Furniture from mum's house, new and old mixture of fabrics
lieing, look to side	3	2	2	2	old, flat, truth
layers, hidden, not transparent	3	2	3	4	transparent, same both sides, no layers
redjimented, structed, square	2	3	2	2	faker, loose, free
not lost, clear, transparent, structure, obvious	2	2	2	2	expensive, lost, not obvious, can be independent
independent, separate, can be alone	4	2	4	4	relient on other two
loose, more movement, textured. There is more of a conversation within the matiral in it's parts	2	2	2	3	tight, strached, flat, not much conversation going on
similarity in surface, the back is the same	2	2	2	2	different, different back
look different, feel the same, not expected	2	2	3	5	looks the same, feels different
structed, square, soft	2	2	2	3	scracthy, flat, boring
movement, interaction, feedback	2	2	2	2	not movement, not feedback, more 'one level'
repreated, same, boring	2	2	2	3	unexpected, hidden, reveal
addictive, feedback, interaction from fabric	2	3	2	2	flat, not feedback, no fabric interaction
pride of authorship	3	3	4	4	that is not my creation
I feel emotionally attached with the final creation	2	3	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	2	2	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	2	3	2	3	the coded pattern did not help at all

Table 7. 115. Participant H - stage three visual unimodal analysis RGT sheet focus analysis.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME		
PARTICIPANT NO: PARTICIPANT H	RGT: TACTILE ☐ VISUAL ☐	TACTILE & VISUAL ■
DATE: 20.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
feel similar -texture wise. It feels like the sofa	4	2	4	3	cushion on top of the sofa
I'd rather lay on them, touching my skin	2	2	2	5	texture and experience of a rug from my mum's house. I wouldn't lay on it
based on the fact that I'd actually wear them	2	3	2	5	Trousers that I bought, I didn't like them and sent them back. I'd like to wear that matt
they feel similar, they should be together. Positive and negative as you don't want too much of the same thing, too boring	3	4	2	4	I'd remove the mistress, not because she doesn't belong there
I don't like the scratchiness of it. Negative feeling on my skin	4	2	4	1	feels softer, I'd have it on my skin
feels nice in one side. Cushions that mum got, green ones, mixed textures. It feels like that. Square cushion	2	2	2	5	feels scratchy, rug. Furniture from mum's house, new and old mixture of fabrics
lieing, look to side	3	2	3	3	old, flat, truth
layers, hidden, not transparent	3	3	3	3	transparent, same both sides, no layers
redjimented, structed, square	2	4	3	2	faker, loose, free
not lost, clear, transparent, structure, obvious	2	3	3	2	expensive, lost, not obvious, can be independent
independent, separate, can be alone	4	2	4	4	relient on other two
loose, more movement, textured. There is more of a conversation within the matiral in it's parts	2	2	3	2	tight, strached, flat, not much conversation going on
similarity in surface, the back is the same	2	3	1	3	different, different back
look different, feel the same, not expected	1	2	2	4	looks the same, feels different
structed, square, soft	2	2	2	5	scracthy, flat, boring
movement, interaction, feedback	2	2	4	2	not movement, not feedback, more 'one level'
repreated, same, boring	3	4	2	2	unexpected, hidden, reveal
addictive, feedback, interaction from fabric	2	2	3	2	flat, not feedback, no fabric interaction
pride of authorship	3	4	4	4	that is not my creation
I feel emotionally attached with the final creation	3	4	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	3	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	2	4	3	3	the coded pattern did not help at all

Table 7. 116. Participant H - stage three tactile-visual bimodal analysis RGT sheet.

STAGE THREE: COMPUTER-LED CO-DESIGN EXPERIENCE PROCESS AND OUTCOME

PARTICIPANT NO: PARTICIPANT H	RGT: TACTILE ☐ VISUAL ☐ TACTILE & VISUAL ■	
DATE: 20.03.2020	TIME: 2:30 PM	PLACE: BENZIE BUILDING BZ314

CONSTRUCT - 01	TEXTILE SAMPLE 01	TEXTILE SAMPLE 02	TEXTILE SAMPLE 03	TEXTILE SAMPLE 04	CONTRAST - 05
feel similar -texture wise. It feels like the sofa	4	2	4	3	cushion on top of the sofa
I'd rather lay on them, touching my skin	2	2	2	5	texture and experience of a rug from my mum's house. I wouldn't lay on it
based on the fact that I'd actually wear them	2	3	2	5	Trousers that I bought, I didn't like them and sent them back. I'd like to wear that matt
they feel similar, they should be together. Positive and negative as you don't want too much of the same thing. too boring	3	4	2	4	I'd remove the mistress, not because she doesn't belong there
I don't like the scratchiness of it. Negative feeling on my skin	4	2	4	1	feels softer, I'd have it on my skin
feels nice in one side. Cushions that mum got, green ones, mixed textures. it feels like that. Square cushion	2	2	2	5	feels scratchy, rug. Furniture from mum's house, new and old mixture of fabrics
lieing, look to side	3	2	3	3	old, flat, truth
layers, hidden, not transparent	3	3	3	3	transparent, same both sides, no layers
redjimented, structed, square	2	4	3	2	faker, loose, free
not lost, clear, transparent, structure, obvious	2	3	3	2	expensive, lost, not obvious, can be independent
independent, separate, can be alone	4	2	4	4	relient on other two
loose, more movement, textured. There is more of a conversation within the matiral in it's parts	2	2	3	2	tight, strached, flat, not much conversation going on
similarity in surface, the back is the same	2	3	1	3	different, different back
look different, feel the same, not expected	1	2	2	4	looks the same, feels different
structed, square, soft	2	2	2	5	scracthy, flat, boring
movement, interaction, feedback	2	2	4	2	not movement, not feedback, more 'one level'
repreated, same, boring	3	4	2	2	unexpected, hidden, reveal
addictive, feedback, interaction from fabric	2	2	3	2	flat, not feedback, no fabric interaction
pride of authorship	3	4	4	4	that is not my creation
I feel emotionally attached with the final creation	3	4	3	4	I have just been involved in the design process
the text helped to load the textile with E.E.	2	4	3	4	the text did not help at all
the coded pattern helped to load the textile with E.E.	2	4	3	3	the coded pattern did not help at all

Table 7. 117. Participant H - stage three tactile-visual bimodal analysis RGT sheet focus analysis.

7.8. APPENDIX G: STAGE THREE IN-DEPTH ONLINE VIDEO CALL INTERVIEW

7.8.1. Participant A > In-depth online video call interview > 02.02.2021

Designer-Researcher > DR
Participant A > PA

DR: Introduction of the session

DR: Thank you for doing these 6 sessions. (Participant looking inside the bag that contains the textile) No, don't look at it.

PA: I don't know what's in here

DR: Please, if you use first the hand sanitiser just before you touch the textile. I will be sharing my screen with you in a second.
So the interview is divided in four sections and I don't think it will take more than 40 minutes.

PA: Okay.

DR: The first part of the session consists of three questions about tactile analysis of the textile. Then I ask three more questions about the visual analysis. Followed by co-design process, Emotional Experience and ending up with digital coding.

PA: Okay.

DR: How does the textile feel to you?

(The participant touches the textile by inserting the hand into the bag. No visual contact.)

PA: It's soft, like there is a pattern there obliviously, but it's very nice. It does kind of remind me of a blanket I have from IKEA or something like that. The ones [blanket] kind of woven ones.
Yeah. I'm serious. I'm excited to see it.

DR: Does it remind you of anything in particular?

PA: I've got a blanket from IKEA blanket, like this soft.

DR: Does the textile elicit an Emotional Experience when you touch it?

PA: Nostalgia. It feels like a Tablecloth or something that my grandma used to have.

DR: The one that you mentioned during sensory perception analysis?

PA: Yes, that one.

DR: How does the textile look to you?

(Participant removes the textile from the bag.)

PA: It's really big. Wow.
I really like it. The patterns work nicely together. Yeah.

DR: Does it remind you of anything in particular?

PA: The full pattern is weird because when we were designing it, I thought it would look like a QR code, but it doesn't. It's something a little bit of videogaming about it, like Kubics. I remember playing it. It has this kind of long patterns, like the textile.

DR: Does the textile elicit an Emotional Experience when you look at it?

PA: Yeah, I mean, it's really weird knowing that you've helped kind of design it. In a way like it's an interesting one. Yeah. I am really happy to see it. Yes, it's good to see.

DR: Based on the sensory perception, which analysis, tactile or visual, did give you more information?

PA: I think touching kind of did. Yeah. There's something really nice about it when touching it.

DR: Which one of the analyses helped you to elicit more Emotional Experience on the textile?

PA: Probably touching it as well.
DR: Why?
PA: Because it's feeling, it's really soft.

DR: Based on the computer-led co-design experience, which consisted of sensory perception analysis, computer-based interfaces, four co-designed textile samples and this final co-designed textile; how do you feel being part of this co-design process?

PA: It's been interesting. Yeah. I've never really been involved with textiles things before, but it has been interesting. And exciting, I guess, I mean, it's been fun, it's been one of those kinds of things that I forgot it was going to be a final thing at the end until it is.
DR: Are you more excited now that you have seen the final outcome than when you were doing the process?
PA: Yeah, I think so.

DR: Do you feel that you designed the textile yourself, you co-design it or that you only participated in the project?

PA: I feel like. Definitely part of a co-design kind of thing, I feel like it's been kind of I give inspiration and then you went away and did it.

DR: Do you think that during the process of co-designing your voice was heard?

PA: You've been, kind of, listening and stuff. Even when I've been, like pulling in references for obscure things.

DR: If you feel that you co-designed it; did the process help you to elicit an Emotional Experience on the textile?

PA: Yeah, it feels like something that I helped to make, which makes it kind of, you know, very different if it was just like a piece that you have seen somewhere. It's interesting that I know the kind of story behind it and how it was kind of put together, I guess.

DR: Do you think that this textile reflects your personality when you see and touch it?

PA: A little bit. I don't know the personality. It definitely reflects a lot of the things I kind of like, and kind of what we were seeing and touching during the other interviews, the textile samples. Yeah.

DR: Do you think that during the experience of co-designing, you achieved a creative achievement throughout the process?

PA: In a way yes. I mean, it's different than something that I have physically made myself, but it's really weird to know that it's a piece of writing that I did that has kind of gone through and become this. There is a kind of sense of achievement there, I suppose.

DR: The process of co-designing that I've been using in this research is computer-led co-design experience approach. Its definition is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Do you think that the process that you experience aligns with this definition?

PA: Yes, I would say so. Yeah.
DR: Could you elaborate on that a little bit more?
PA: I think I was active when selecting the patterns, and the textile is supposed to be for me.

DR: Does the translation of text into a pattern, using the code that you selected, have a positive impact to the textile?

(The text selected was the one with emotional connection that Participant A wrote and the code was random code.)

PA: Yest, I would say so. Yeah. Knowing that it's been part of it, it does give an impact to it.

DR: Does the materiality of the text – the text becomes a code, and then the code become a pattern, and the pattern becomes a textile – elicit an Emotional Experience?

PA: I think it does. Yeah.
DR: Why?
PA: Because the text started the design of the textile and I know I can touch it.

DR: Does the look of the code remind you of digital coding aesthetics on the textile?

PA: You know what I saw on screen, I thought it would. But in terms of the actual textile, I don't think it does. No, it's it feels more organic than it did on screen.
DR: More organic than the co-designed textile samples of the previous interview?
PA: Yeah, I think a little bit more this one than the others.

DR: Does knowing that the pattern is generated through digital coding by translating your text elicit an Emotional Experience?

PA: Yeah, I think knowing that the pattern comes from words, definitely. It adds to it.

DR: Does the text elicit in you Emotional Experience?

PA: Yeah, it does bring an emotional connection.

DR: Would you change your text, yarns, weave or structures in order to elicit Emotional Experience?

PA: You know, I don't think I would change a thing, I like the way it is. Yeah.

DR: Do you have anything else to add that you think it might benefit the research?

PA: I think the sessions were fine. The ones where you were touching stuff and thinking about things, I think it was good to have them apart. But by the time you get to the co-design things, I think they could maybe be closer together. You know, because you don't really have to reset how you're thinking about it, I guess. But yeah.

DR: Thank you for your feedback and your collaboration during this research. Your participation has been of much value.

PA: Thanks, it was nice.

7.8.2. Participant B > In-depth online video call interview > 03.02.2021

Designer-Researcher > DR
Participant B > PB

DR: Introduction of the session

DR: Thank you for doing these 6 sessions.
Please, if you use first the hand sanitiser just before you touch the textile. I will be sharing my screen with you in a second.
So the interview is divided in four sections and I don't think it will take more than 40 minutes.

PB: Okay.

DR: The first part of the session consists of three questions about tactile analysis of the textile. Then I ask three more questions about the visual analysis. Followed by co-design process, Emotional Experience and ending up with digital coding.

PB: Thanks.

DR: How does the textile feel to you?

(The participant touches the textile by inserting the hand into the bag. No visual contact.)

PB: It feels like luxurious. It feels like there're tassels on it. Tactility like little threads hanging. It feels like it has a pattern that it's raised.
I like the feeling of it. It feels like expensive. What I would associate to an expensive feeling. Pieces of clothing.

DR: Does it remind you of anything in particular?

PB: It sort of reminds me of, like, throws that you'd get in, like hotel rooms are expensive, like all like tapestry.

DR: Does the textile elicit an Emotional Experience when you touch it?

PB: I feel similar to places I've been and things I've touched. But I can't associate to a particular object.

DR: How does the textile look to you?

(Participant removes the textile from the bag.)

PB: It's big, isn't it?
I really like it. I like that the colour is plain and simple, but you have that in… I think it's like a nice balance. It reminds me a bit of Moroccan style and garments.

DR: Does it remind you of anything in particular?

PB: It sort of reminds me of like holidays and things like that. Like a trip abroad to different places when you go to market stalls and they sell.
I haven't been in Morocco but I want to go.

DR: Does the textile elicit an Emotional Experience when you look at it?

PB: Yes it brings nice feelings, like holiday vibes.

DR: Based on the sensory perception, which analysis, tactile or visual, did give you more information?

PB: I think feeling it because you use your imagination more. Like, I didn't expect it to be white, I could feel I detect the pattern seen similar to what I was feeling, but because you don't know if it's what it is, what colour or if it's going to have a colour.
I was imagining to be like yellows, reds or blues. The primary colours really. I think, again, that sort of Moroccan style and fabrics.

DR: Which one of the analyses helped you to elicit more Emotional Experience on the textile?

PB: Tactile again. Yeah.

DR: Based on the computer-led co-design experience, which consisted of sensory perception analysis, computer-based interfaces, four co-designed textile samples and this final co-designed textile; how do you feel being part of this co-design process?

PB: Yeah, I feel closer to the textile because you know that it's come from sort of partly your ideas and your imagination and because everyone thinks differently, so it's like unique to you. It's like very unlikely someone's going to have the same textile.

DR: Do you feel that you designed the textile yourself, you co-design it or that you only participated in the project?

PB: I feel like I designed it myself, even though, it had limited options, you still have to choose options. And in any process of design even creating a woven textile you would still only have a certain number of designs to choose from anyway. By co-designing it has some sort of impact.

DR: Do you think that during the process of co-designing your voice was heard?

PB: Yeah, especially when we were doing… I think it was the one before this session… when we chose and designs on the computer. Yeah.

DR: If you feel that you co-designed it; did the process help you to elicit an Emotional Experience on the textile?

PB: Yeah, because it doesn’t just feel like with other textiles you can only buy from a shop, maybe some sort of emotional attachment if you bought it on holiday or from somewhere. And it's got that sort of connection to it. But this is all your thoughts and your feelings and what you like and how things feel to you. And you wouldn't usually think about it. That's when it becomes emotional then.

DR: Do you think that this textile reflects your personality when you see and touch it?

PB: I think so, because when I look at it, as I said earlier, I feel like it's not simple because it has a pattern, but it's not over the top. And that's sort of what I tend to stay towards, I don't like things that are overly complicated or really simple. I sort of like a middle ground.

DR: Do you think that during the experience of co-designing, you achieved a creative achievement throughout the process?

PB: Yeah, I think I would say so. I've never made a textile before using sort of my emotions and my thoughts is actually really interesting and intriguing.

DR: The process of co-designing that I've been using in this research is computer-led co-design experience approach. Its definition is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Do you think that the process that you experience aligns with this definition?

PB: Yes.

DR: Could you elaborate it a little bit more?

PB: I feel that I designed the textile and it's my text there.

DR: Does the translation of text into a pattern, using the code that you selected, have a positive impact to the textile?

(The text selected was the one with emotional connection that Participant B wrote and the code was ASCII.)

PB: Yes, and I think it was coming from like a fine art background and you sort of like a narrative with that piece anyway. So it's nice to think that stories or messages could be told through a piece of textile while that's all hidden as well as very futuristic.

DR: Does the materiality of the text – the text becomes a code, and then the code become a pattern, and the pattern becomes a textile – elicit an Emotional Experience?

PB: Yeah, I would say so. It does, yeah.

DR: Does looking at the code remind you of digital coding aesthetics on the textile?

PB: A little bit. But I wouldn't have known that if I had not seen the pattern in the screen, I wouldn't have thought of it like that.

DR: Does knowing that the pattern is generated through digital coding by translating your text elicit an Emotional Experience?

PB: I think it's only because I've seen it myself.

DR: Does the text elicit in you Emotional Experience?

PB: I think to me, it does release an Emotional Experience, maybe to someone that had been part of the project and just looked up at the textile and it would be the same as just having the words on the on the piece of the textile.
If the code was random it wouldn't have the same impact because then I would feel like the computer's taken the control.
Also the text elicits emotional experience, it's about where I grew up and it's special for me as a Welsh person as well.

DR: Would you change your text, yarns, weave or structures in order to elicit Emotional Experience?

PB: The only change would be adding colour, but apart from that I wouldn't change anything.

DR: Do you have anything else to add that you think it might benefit the research?

PB: The session being closer together, but with COVID-19 I think it was impossible.

DR: Thank you for your feedback and your collaboration during this research. Your participation has been of much value.

PB: Thank you.

7.8.3. Participant C > In-depth online video call interview > 09.02.2021

Designer-Researcher > DR
Participant C > PC

DR: Introduction of the session

DR: Thank you for joining this interview.
Please, if you use first the hand sanitiser just before you touch the textile. I will be sharing my screen with you in a second.
So the interview is divided in four sections and I don't think it will take more than 40 minutes.

PC: Great.

DR: The first part of the session consists of three questions about tactile analysis of the textile. Then I ask three more questions about the visual analysis. Followed by co-design process, Emotional Experience and ending up with digital coding.

PC: Okay.

DR: How does the textile feel to you?

(The participant touches the textile by inserting the hand into the bag. No visual contact.)

PC: Soft, smooth and silky. I like it.

DR: Does it remind you of anything in particular?

PC: Yeah. Actually, it reminds me of something really specific. So today at work it was a white cloth, kind of like a small Tablecloth, but it had holes in it and it felt really similar to this. The fabric felt really similar.

DR: Does the textile elicit an Emotional Experience when you touch it?

PC: Not emotionally, but it reminds me so much of the white cloth that I touched today that I just remember putting it up and just put it back, it feels like the same, the same material. I don't know if that was just because that happened today so is fresh because it only happened an hour ago. Or if it is actually that similar, it feels like that.

DR: How does the textile look to you?

(Participant removes the textile from the bag.)

PC: I like it.

DR: Does it remind you of anything in particular?

PC: When I look at it, the cloth that I spoke about earlier when I felt it, I'm not I don't see it look completely different. I just felt the same. This kind of looks like I feel like we spoke about this before, but my grandma has these pink covers that she put on the sofa and it looks similar to that, but white because of the shine that the fabric has to it. But it feels softer.
I don't like the covers of my grandma because they're really rough, so this looks the same when hold it from a distance, but it feels completely different.

DR: Does the textile elicit an Emotional Experience when you look at it?

PC: Yes it does because it reminds me of my grandma.

DR: Based on the sensory perception, which analysis, tactile or visual, did give you more information?

PC: When I see it.

DR: Which one of the analyses helped you to elicit more Emotional Experience on the textile?

PC: Sight because when I touched it, I could only related to the cloth.

DR: Based on the computer-led co-design experience, which consisted of sensory perception analysis, computer-based interfaces, four co-designed textile samples and this final co-designed textile; how do you feel being part of this co-design process?

PC: I enjoyed it, like I liked the one on the screen and you could pick the patterns and you could see it, but then what I found interesting is like stuff that I touched before and I was like, oh, I like that one. I don't like that. And then when I saw it, it was completely different. So then I found what I found difficult was I felt like when I picked the end, it was completely different to what I've said in previous sessions.
So like, I like the look of things, but then I hated what they felt like when my eyes were closed and vice versa. So then when I was trying to pick, I was like, I don't know, I think I was leaning more to the sight rather than the touch.

DR: Do you feel that you designed the textile yourself, you co-design it or that you only participated in the project?

PC: I think I designed it. I don't think I just said things and then disappeared. I think definitely some of the decisions, I felt like they were my decision. I don't know what you changed before you made the final one, but I think I was definitely involved in what it looks like finally, even because the text that I like made the code, I picked them.

DR: Do you think that during the process of co-designing your voice was heard?

PC: No, I think I definitely chose it, like even if at times I felt like I was being indecisive and I was like, oh, I don't know, I don't know whether I prefer this or that when I look or touch it, I think I still came to that decision rather than you saying, like, if I was unsure, you just wait. And eventually I decided rather than every time I was unsure you picked like you kind of pushed me towards one. I think I picked everything.

DR: If you feel that you co-designed it; did the process help you to elicit an Emotional Experience on the textile?

PC: Yeah. More so now that I've answered these questions, and at the start, I was like touching, I was like, OK, does it remind me of anything? I don't know. But then now that I've talked through the questions of like, yeah, I decided this. I decided that I feel more attached to it now that I did ten minutes ago, which is strange.

DR: Do you think that this textile reflects your personality when you see and touch it?

PC: Yeah, I think so, because it's all the same and it's very uniform and I like that. I think that's how I like I like things to be a certain way. I think this reflects that.

DR: Do you think that during the experience of co-designing, you achieved a creative achievement throughout the process?

PC: I think. I want to say that, yes, but only a small bit, because I'm so used to like making things myself, I think that's in my head that's a great achievement, because that's just how I work in my own practise, because I've designed it. Then someone else has made it. I feel like that the process isn't mine. I am more the designer rather than the maker, and for me, as a creative achievement, I get that more when I'm both. And then I'm like, right, it's mine. I've done it. I think even if, like, I make something that someone else has designed or I design something, someone else makes it, I think I need both parts and to make for it to be completely mine.

DR: The process of co-designing that I've been using in this research is computer-led co-design experience approach. Its definition is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Do you think that the process that you experience aligns with this definition?

PC: Yes, because if I had not been there, this wouldn't have looked like this. Therefore I have designed it.

DR: Does the translation of text into a pattern, using the code that you selected, have a positive impact to the textile?

(The text selected was the one with emotional connection that Participant C wrote and the code was ASCII.)

PC: I think so. And I'm glad that I chose this text for the pattern. Because I think if I picked like one of the other random text, which were not... Like when I read this text, I remember that one, like I like those words. So I'm glad that it's in the textile rather than a random text.

DR: Does the materiality of the text – the text becomes a code, and then the code become a pattern, and the pattern becomes a textile – elicit an Emotional Experience?

PC: Yes. Now that I've seen the text again, because I think like before, I'll be honest, I couldn't remember exactly which one it was, but now that I've seen again and I've reread it, I'm like more emotionally attached to this because it feels, it sounds like really I don't know what the word would be like. The words are actually inside it, even though that's completely a strange thing to say. But yeah, I'm glad that I got text over the others.

DR: Does the look of the code remind you of digital coding aesthetics on the textile?

PC: I don't know. I don't know what coding aesthetics would look like.

DR: The black and white squares look, like pixels.

PC: I don't think it does. Like if I didn't see the black and white squares on the screen, I wouldn't look at that and think, it looks like that. I just think it looks like a textile pattern.

DR: Does knowing that the pattern is generated through digital coding by translating your text elicit an Emotional Experience?

PC: Yes, I think I might have answered this maybe slightly earlier by saying that I'm happy the text is in here. But yet in short answer. Yes.

DR: Does the text elicit in you Emotional Experience?

PC: Yes it does. As I said I'm happy that the text is translated into this pattern.

DR: Would you change your text, yarns, weave or structures in order to elicit Emotional Experience?

PC: Yeah, I'm really happy with the text. I definitely wouldn't change the text. The only thing I would change, but then I think it would just make it more complicated. I'd add colour to add like an extra layer of so you pick the yarn, you pick the text, but it would have been nice to also be able to pick the colour. That's the only thing I think I'd add. Yeah.

I think orange with beige. So I'd have this like smoother than here in orange and then this diagonal I'd have that beige. That's the only thing I'd change. But then it would just be too much to have too many different options.

DR: Do you have anything else to add that you think it might benefit the research?

PC: My only feedback would be like after the end of each session, I'd want to keep track of my answers just because I feel like now it's been so long, I've forgotten what I said in the first session. I can't remember and I can't remember any of my answers, like for a lot of the things and I think it'd be interesting to see at the end, if like the things that I was saying at the start were the same throughout the sessions. Because I think there were a couple of sessions, but probably, I don't know in might have depending on how I was feeling that day, I'd have touched exactly the same textile, but I'd have a completely different response to it. So I think it'd be interesting to keep track of what we were saying in each one and what we like at the start and then if that changed.

DR: Thank you for your feedback and your collaboration during this research. Your participation has been of much value.

PC: It was fun, thanks.

7.8.4. Participant D > In-depth online video call interview > 04.02.2021

Designer-Researcher > DR
Participant D > PD

DR: Introduction of the session

DR: Thank you for joining this interview.
Please, if you use first the hand sanitiser just before you touch the textile. I will be sharing my screen with you in a second.
So the interview is divided in four sections and I don't think it will take more than 40 minutes.

PD: Okay.

DR: The first part of the session consists of three questions about tactile analysis of the textile. Then I ask three more questions about the visual analysis. Followed by co-design process, Emotional Experience and ending up with digital coding.

PD: Okay.

DR: How does the textile feel to you?

(The participant touches the textile by inserting the hand into the bag. No visual contact.)

PD: It feels very, very nice already. Yeah, it feels very soft. I think it's very nice. Soft and sort of familiar.

DR: Does it remind you of anything in particular?

PD: No, but I've put my hand in it is like a glove, and it's just I feel very comforTable. I don't know why, but nothing particular. Nothing specific.

DR: Does the textile elicit an Emotional Experience when you touch it?

PD: Yeah. Oh yeah, no joke I feel very happy right now. I don't know why.

DR: How does the textile look to you?

(Participant removes the textile from the bag.)

PD: I really like it. That's really nice. What does it look like outside of a Tallit. I don't know. But I really like how it looks almost like it's stretchy, it's not that stretchy, but it's. Oh, God, it's really soft. Can I ask for the textiles we went for at the end?

DR: Does it remind you of anything in particular?

PD: OK, weirdly, now it does remind me of something particular. So I come from a Jewish family, and when you're younger. Well, I mean, at any age, but when you're younger and you take it to Sunday school, you have to wear something called Tallit, which looks like this. You were like a shawl. You must have seen in religious Jewish people. Not that I'm religious, but it was a … you know, but that's what it reminds me of.

DR: Does the textile elicit an Emotional Experience when you look at it?

PD: Nostalgia, definitely. I am, yeah, looking at it, nostalgia, not so much happiness, just sort of, you know…

DR: Based on the sensory perception, which analysis, tactile or visual, did give you more information?

PD: Visual.

DR: Which one of the analyses helped you to elicit more Emotional Experience on the textile?

PD: Touching was just straight away, when I had to analyse more.

DR: Based on the computer-led co-design experience, which consisted of sensory perception analysis, computer-based interfaces, four co-designed textile samples and this final co-designed textile; how do you feel being part of this co-design process?

PD: Yeah, I've really enjoyed the process. It was. You know, I haven't really worked with anyone like this, but I really, I really enjoy it. Sitting through it all and then, yeah, the final piece here is now. It just makes me feel very good, like awesome that, you know, we've made something that's nice.

DR: Do you feel that you designed the textile yourself, you co-design it or that you only participated in the project?

PD: From a tactile point of view, I feel this is it, if you were to present me with this out of the blue, I'd go, this has been made specifically for me because it feels just so very nice. But from a design point of view, that is definitely a collaboration. Yeah. And I don't feel passive for the third part of the question. I feel I've been active and the tactility of it certainly speaks to that. But the actual design. I can't even remember what we typed. I assume this is still type. So yeah. No, I definitely feel like that it's collaborative.

DR: Do you think that during the process of co-designing your voice was heard?

PD: I don't remember you ever pushing me to make any decision so yes I think I took my decisions.

DR: If you feel that you co-designed it; did the process help you to elicit an Emotional Experience on the textile?

PD: Again, from the tactility of it, from the feel of it, yes, 100 percent. From the design of it, I like the design that it because I can't because I don't know what it says. I can't remember.

If I knew what it says, it may change my opinion. I'm not asking for you to tell me right now. It may be it's part of the data, but, that may that I may have more of a connection with it visually if I knew what it says. I'm guessing.

DR: Do you think that this textile reflects your personality when you see and touch it?

PD: Yeah. Kind of everything, actually. Definitely. As a whole piece. This would not be out of place in my possessions, if you looked at everything that I have, you would go, oh yeah, that fits right in there. Yeah.

DR: Do you think that during the experience of co-designing, you achieved a creative achievement throughout the process?

PD: Um. Kind of one of the reasons that I have been so happy to help you with this is that I always wanted to. You know, I like having lots of experiences in different fields that are not my profession. And I always wanted to do something in textile, I didn't know what. So I'm even though I haven't, you know, made this or co-designed it, you know. And now it's a real thing that exists and I'm very happy about that. So, yes, I feel there's been a creative achievement here.

DR: The process of co-designing that I've been using in this research is computer-led co-design experience approach. Its definition is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Do you think that the process that you experience aligns with this definition?

PD: Yes, yes. I do think that it aligns with the definition, but there were certain things that... How do I put it? You know, when you typed, so the patterns were already there, and for some reason in my head, I thought that it would be in colour. I don't know why, but it's so all white. So not that there's anything wrong with that, but a... yeah. If I don't feel like I wasn't invoked completely, but… I don't really know what I'm trying to say, that I think that your definition here definitely aligns with what I've experienced. If it had colour and other options I would feel I collaborated more. This is gorgeous, by the way. This is absolutely gorgeous. But I am a colour person, I'm very much a colour person attracted to very rich things. So yeah.

DR: Does the translation of text into a pattern, using the code that you selected, have a positive impact to the textile?

(The text selected was the one with emotional connection that Participant D wrote and the code was ASCII.)

PD: So, I've lost touch with this person now after a year, you know. And in fact, it was his 40th birthday a couple of days ago. So this is kind of. Bittersweet, I would say.

DR: Does the materiality of the text – the text becomes a code, and then the code become a pattern, and the pattern becomes a textile – elicit an Emotional Experience?

PD: It does, but it's difficult to put into words.

DR: Could you try to describe it?

PD: It has a lot of feelings to it, because the meaning of the text and the situation right now [referring to the text].

DR: Does the look of the code remind you of digital coding aesthetics on the textile?

PD: Yeah, on screen it looks like a QR code. It it's the effect is very subtle on the textile, but it's there. I think it's because it's folded over, you can't really tell . When it's unfolded, it it's more obvious.

DR: Does knowing that the pattern is generated through digital coding by translating your text elicit an Emotional Experience?

PD: It imbues the textile with a certain... you know, specific personality, so, sure. A little bit. It makes it a little personal, you know.

DR: Does the text elicit in you Emotional Experience?

PD: Yeah. There's a weird added layer of tactility weirdly enough. You don't need to know the whole story. But this is a couple that I knew and that we've lost touch. And it's kind of sad. But the I you know, I was having an argument with this guy's wife, and she and I have known each other for many years. She has a blanket which is very silky soft like this. And it's a weird thing that has cropped up in all the time that we've known each other in this weird kind of soft, velvety blanket thing that she's gotten. So it's funny that I also have a very soft thing which has got her written all over it. So It's odd. Yeah, yeah, yeah, it does.

DR: Would you change your text, yarns, weave, structures or in order to elicit Emotional Experience?

PD: No, I couldn't. I think this is perfect.

DR: Do you have anything else to add that you think it might benefit the research?

PD: Yeah. If these sessions would that would have happened again, not for me in the future, hmm... I was going to say, obviously, there's been a delay in us being able to finish the project... But weirdly, that's added to it because it makes me remember things from a long time ago that sort of have more resonance now. So I think, you know, I'm perfectly happy with it in terms of the outcome. I think this is beautiful. I always like more colour, like you've said as well. But that's not really a change to the session. Yeah, no, I've really enjoyed this project.

DR: Thank you for your feedback and your collaboration during this research. Your participation has been of much value.

PD: Thank you.

7.8.5. Participant E > In-depth online video call interview > 20.02.2021

Designer-Researcher > DR
Participant E > PE

DR: Introduction of the interview

DR: Thank you for joining this interview.
Please, if you use first the hand sanitiser just before you touch the textile. I will be sharing my screen with you in a second.
So the interview is divided in four sections and I don't think it will take more than 40 minutes.

PE: Okay.

DR: The first part of the session consists of three questions about tactile analysis of the textile. Then I ask three more questions about the visual analysis. Followed by co-design process, Emotional Experience and ending up with digital coding.

PE: Okay.

DR: How does the textile feel to you?

(The participant touches the textile by inserting the hand into the bag. No visual contact.)

PE: It feels like... I don't know... Like a heavy blanket. I don't know how to describe it. It's soft though. Like a mix between a rug and a blanket. Such a weird... feels nice though. And it feels like soft and kind of shiny to touch.
I really like it and I really like this, the frilly bit, not frilly, it's a tassel. I like that.

DR: Does it remind you of anything in particular?

PE: Yeah, it reminds me of my baby blanket, when I was growing up. Because of the texture.

DR: Does the textile elicit an Emotional Experience when you touch it?

PE: Reminds me of when I had like heat rash. Because of the, you know, the texture of this like my baby blanket. When I was little, I had a heat rush. And then, like, it's like, itchy, the heat rash. That's what it feels like.

DR: How does the textile look to you?

(Participant removes the textile from the bag.)

PE: It looks like a Tablecloth. A nice Tablecloth. I quite like it. When things are white, I think it's kind of hard to love it because I like neutral colours always like I just like them. So I've never really hated them. So you could have made anything in white probably and I would have liked it.

DR: Does it remind you of anything in particular?

PE: Yeah, Tablecloth. I don't have one, but my nana does. So, yeah, it reminds me of Christmas dinner at Christmas time. Because it's like a fancy Tablecloth.

DR: Does the textile elicit an Emotional Experience when you look at it?

PE: Yeah, just like Christmas dinner, like happy family times that people together just nice, like moments like that.

DR: Based on the sensory perception, which analysis, tactile or visual, did give you more information?

PE: Provably touching it. I reckon.

DR: Which one of the analyses helped you to elicit more Emotional Experience on the textile?

PE: Definitely touching. Yeah.

DR: Based on the computer-led co-design experience, which consisted of sensory perception analysis, computer-based interfaces, four co-designed textile samples and this final co-designed textile; how do you feel being part of this co-design process?

PE: I don't know, I suppose it's interesting since I've never been part of the co-design process before, especially when I haven't spoken or been interacting with any of the other participants. So it's interesting to see how the final result turned out when it's a collaboration. But like, I feel like I haven't collaborated at all, I have just done some tasks for you.

DR: Do you feel that you designed the textile yourself, you co-design it or that you only participated in the project?

PE: I feel like I participated in the project.

DR: Do you think that during the process of co-designing your voice was heard?

PE: Yeah, definitely. I can see, you know, when we did the type and I can see that kind of structure. And I can also remember the little samples and they have diamonds in them and I can see the diamonds, which I liked.

DR: If you feel that you co-designed it; did the process help you to elicit an Emotional Experience on the textile?

PE: It does elicit Emotional Experience, but I don't really know how I co-design it, so I think a lot of textiles will if they're textured, they'll elicit some little things in my house, a texture. They'll always be an Emotional Experience to touch.

DR: Do you think that this textile reflects your personality when you see and touch it?

PE: No.

DR: Could you specify more?

PE: I don’t identify with the textile itself.

DR: Do you think that during the experience of co-designing, you achieved a creative achievement throughout the process?

PE: I don't think so, because I don't really feel like it's mine. I think it's really cool, once I'm touching it.

DR: The process of co-designing that I've been using in this research is computer-led co-design experience approach. Its definition is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Do you think that the process that you experience aligns with this definition?

PE: Yeah, I think it does. Definitely.

DR: Does the translation of text into a pattern, using the code that you selected, have a positive impact to the textile?

(The text selected was the one with emotional connection that Participant E read and the code was ASCII.)

PE: No, no, because it's not the words, I think the words mean a lot more than, I know, I know it means the same, but it's not the same.

DR: Does the materiality of the text – the text becomes a code, and then the code become a pattern, and the pattern becomes a textile – elicit an Emotional Experience?

PE: I think it's a similar answer, they are not the actual words, so for me words mean a lot more.

DR: Does look of the code reminds you of digital coding aesthetics on the textile?

PE: No, because it's like, because it is white and it's like textured, I think it's much more subtle. Like it's not like in your face. And I think that takes it away from like that digital aspect.

DR: Does knowing that the pattern is generated through digital coding by translating your text elicit an Emotional Experience?

PE: Oh, yeah, knowing that it does definitely does, because if I didn't know, then it wouldn't mean anything. But knowing, like knowing that it's the same that it doesn't look like it's that.

DR: Does the text elicit in you Emotional Experience?

PE: Yes, it does.

DR: Would you change your text, yarns, weave, structures or in order to elicit Emotional Experience?

PE: No, I like it.

DR: Do you have anything else to add that you think it might benefit the research?

PE: I don't you know, I suppose just because of Corona, it was a very long process, which meant I kind of like forgot. That's not your fault. That's like the pandemic's fault. If it had been closer together, I would it would have been like much more in my brain.

DR: Thank you for your feedback and your collaboration during this research. Your participation has been of much value.

PE: Thanks, I enjoyed it.

7.8.6. Participant F > In-depth online video call interview > 10.02.2021

Designer-Researcher > DR
Participant F > PF

DR: Introduction of the interview

DR: Thank you for joining this interview.
Please, if you use first the hand sanitiser just before you touch the textile. I will be sharing my screen with you in a second.
So the interview is divided in four sections and I don't think it will take more than 40 minutes.

PF: Okay.

DR: The first part of the session consists of three questions about tactile analysis of the textile. Then I ask three more questions about the visual analysis. Followed by co-design process, Emotional Experience and ending up with digital coding.

PF: Okay.

DR: How does the textile feel to you?

The participant touches the textile by inserting the hand into the bag. No visual contact.

PF: It's just soft. It feels like a blanket. It feels like a ruffled skirt, and that's weird. Nice, nice.

DR: Does it remind you of anything in particular?

PF: It just feels and reminds me of ruffled skirt, but like not something that I had like. It just feels like something I would probably see on Instagram.
Also, the bit that isn't riveting is that it reminds me of a throw blanket because it's got like the frayed edges, I don't know if this is part of it.

DR: Does the textile elicit an Emotional Experience when you touch it?

PF: Not really. I think I'm just like it lets me visualise like a ruffled skirt for some reason. I don't know why.
In my head, it's like a light pink ruffled skirt, I think.

DR: How does the textile look to you?

(Participant removes the textile from the bag.)

PF: I love it. It reminds me of a kid's blanket. And I feel like that reminds me of a kid's blanket, maybe because I had something similar when I was young, like with the rough, not the rough with the fringes. So that I had a blanket like that when I was young, I would probably I still have it so that reminds me of that.

DR: Does it remind you of anything in particular?

PF: Yeah. The the blanket I used to have was like a light green and white, no cream like cream and light green, blue. And I used to, like, lay on it. But I would never like cuddle it because it was just itchy. This one is like soft, which is nice. Wow, it's massive. It

also reminds me, you know, what it reminds me of, like I used to have a neighbour that used to wear a shawl all the time, like a shawl like that. And she, it reminds me of that as well. I think it's just because… I don't know why it reminds me of her. I don't think it was this material, it's probably just the pattern.

DR: Was that your baby blanket or another one?

PF: No, it wasn't a baby blanket. It was just blankets that we had in the house. And then I used to like when I was a kid, I wanted, like, picnics in the house. Let's just go get the blanket. It used to be under my bed, like in the drawers, in my bed where we store the blankets. I used to take that and also another one. I don't remember the other one.

DR: Does the textile elicit an Emotional Experience when you look at it?

PF: Yes it does.

DR: Based on the sensory perception, which analysis, tactile or visual, did give you more information?

PF: So when I touched it, it was more like I was very set on this one image and now that I'm seeing it like more things are coming to mind.

DR: Which one of the analyses helped you to elicit more Emotional Experience on the textile?

PF: When I was seeing it.

DR: Based on the computer-led co-design experience, which consisted of sensory perception analysis, computer-based interfaces, four co-designed textile samples and this final co-designed textile; how do you feel being part of this co-design process?

PF: I feel like it could be a part of it, but like I remember my feelings like when I was touching all the materials, it's not the same outcome as like touching this one. Like, this one just feels so different because maybe it's like a finished piece and like... I just like it, I feel like I really want to take this home and keep it.

DR: Do you feel that you designed the textile yourself, you co-design it or that you only participated in the project?

PF: I feel like I'm co-designing it. Obviously, because I like all the... the layout that was generated by me, like which square goes where. So I feel like I did definitely and those are my material choices. So I definitely felt part of it. But it doesn't feel like something that I have ever created. So I don't feel like I am the designer.

DR: Do you think that during the process of co-designing your voice was heard?

PF: Definitely about 50/50.

DR: If you feel that you co-designed it; did the process help you to elicit an Emotional Experience on the textile?

PF: I think in every stage it's brought out something different. So I think every material, every text, even this has brought out Emotional Experience that I've never even thought about before touching the other materials separately.

DR: Do you think that this textile reflects your personality when you see and touch it?

PF: In a way, it might sound really weird, but it reminds me of the fact that the squares are like that, it reminds me of like an old video game, like an old video game. Mm hmm. So in that sense, no, because I'm not a gamer at all I don't enjoy that kind of thing. But the softness of the material, the actual material itself yes.

DR: Do you think that during the experience of co-designing, you achieved a creative achievement throughout the process?

PF: I think more the latter, like, I don't really feel like I've achieved anything like. I feel like I've helped you achieve your goal, but I don't feel like I've myself gone like that's my style.

DR: The process of co-designing that I've been using in this research is computer-led co-design experience approach. Its definition is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Do you think that the process that you experience aligns with this definition?

PF: Yeah, I think so, because I'm the one that got to choose like if I wasn't happy with it, then I got to change it.

DR: Does the translation of text into a pattern, using the code that you selected, have a positive impact to the textile?

(The text selected was the one without emotional connection that Participant F read and the code was random code.)

PF: It was because it was random, I don't think it has a positive impact. Also because I think when I was choosing it, I didn't really have a connection to the text. It was more like I like the look of it because it doesn't really mean anything.

DR: Does the materiality of the text – the text becomes a code, and then the code become a pattern, and the pattern becomes a textile – elicit an Emotional Experience?

PF: I don't think it's so important. I think at every stage there was an Emotional Experience. I don't think together it is that important.

DR: Does the look of the code remind you of digital coding aesthetics on the textile?

PF: Yeah, Yeah. It reminds me of Packman. Yes, it reminds me of that kind of style and also, like the blocks.

DR: Does knowing that the pattern is generated through digital coding by translating your text elicit an Emotional Experience?

PF: I think it wouldn't matter how it was put out. It was more the fact I could change the pattern until I liked it.

DR: Does the text elicit in you Emotional Experience?

PF: Yes, it does.

DR: Would you change your text, yarns, weave, structures or in order to elicit Emotional Experience?

PF: I think I would have done it differently knowing that, like, this is mine now, I think I would have chosen an emotion like an emotional text to go with it but I think if that had an emotional meaning, the structure, that would be really cool. Because then it would be like mine.

DR: Do you have anything else to add that you think it might benefit the research?

PF: I think well, I know it's obviously covid. I think having them closer together, just sort of like helps the like the connections between the sessions easier, but it's obviously not your fault.

DR: Thank you for your feedback and your collaboration during this research. Your participation has been of much value.

PF: Thanks.

7.8.7. Participant H > In-depth online video call interview > 05.02.2021

Designer-Researcher > DR
Participant H > PH

DR: Introduction of the interview

DR: Thank you for joining this interview.
Please, if you use first the hand sanitiser just before you touch the textile. I will be sharing my screen with you in a second.
So the interview is divided in four sections and I don't think it will take more than 40 minutes.

PH: Got it.

DR: The first part of the session consists of three questions about tactile analysis of the textile. Then I ask three more questions about the visual analysis. Followed by co-design process, Emotional Experience and ending up with digital coding.

PH: Okay.

DR: How does the textile feel to you?

(The participant touches the textile by inserting the hand into the bag. No visual contact.)

PH: it's quite soft, actually. Yes, it's kind of like spongy, like soft. I like the feel of it. It's nice. I think there's quite a lot of fabric; kind of squidgy and nice.

DR: Does it remind you of anything in particular?

PH: I don't think so at the moment.

DR: Does the textile elicit an Emotional Experience when you touch it?

PH: It's definitely positive because it feels nice and enjoyable to the touch and squidgy. So it feels nice in that sense, definitely.

DR: How does the textile look to you?

Participant removes the textile from the bag.

PH: It's got like a lot going on, is it because it's got two sides. One must be to the right side, or the wrong side, maybe? Because there's a different colour I'm not sure. Yeah, it looks nice, it's quite nice detail. The different colours and the lines. Yeah, visually, I think visually it looks good, I like it, it's pleasing.

DR: Does it remind you of anything in particular?

PH: From visually no, but it's kind of... I can't remember if... What you wove into this, which piece of something that I've told you or whatever it's like. If you reminded me

of what is in this, then it would make me feel more attached to it. Because I can't remember what I told you, and I think you put in it. You know, the coding.

DR: Does the textile elicit an Emotional Experience when you look at it?

PH: The only kind of thing like the pattern reminds me of like is Packman or something like that. By the way, that the little blocks, the games something like that. That kind of reminds me of a lot. But I guess I do like playing games, so I guess it's a positive.

DR: Based on the sensory perception, which analysis, tactile or visual, did give you more information?

PH: I think, visual, because when I touched it, I had to imagine in my head what it looked like. But visually, I can see all the details. We've stitched it, the different colours. I think visual gives me more information definitely.

DR: Which one of the analyses helped you to elicit more Emotional Experience on the textile?

PH: I probably say the more visual again. Because, again, you can see shapes and things which then you can associate to stuff if you felt like that, but with the touch a bit more difficult. But I think I am a visual learner, just I think that it might just be like my personal personality affects it maybe.

DR: Based on the computer-led co-design experience, which consisted of sensory perception analysis, computer-based interfaces, four co-designed textile samples and this final co-designed textile; how do you feel being part of this co-design process?

PH: I think it's good to be part of the co-design process because you feel like you have a say on the impact on what the outcome is, I think that's quite good. Because then, like I said, I can't remember what it was... Which text or whatever was coded in, but what I know, then I'll be able to say more. But if I remembered, then, yeah, you definitely feel way more touched then because it's kind of like, like, if it was some kind of a poem or if it was some kind of piece of writing or whatever the text is, you feel that this is kind of like a momentum memory like. Yeah, I would feel more attached to it if I knew what it said.

DR: Or maybe it would not have a positive impact.

PH: Oh yeah, exactly. It's a problem if I chose the negative one, but then equally the negative one. I was quite traumatised by that situation because I was so intense that I feel like... It would also have an emotion attachment, that kind of maybe like feeling like you're going over something and then it is positive. It's like I mean, it reminds you to kind of move forward and stick stuff in the past is also positive.

DR: Do you feel that you designed the textile yourself, you co-design it or that you only participated in the project?

PH: I'd say like in between co-design and participate. So in the middle of those two. Just because I remember doing the stuff on the computer. I felt like I knew what I was doing because you explained it. But also I did it. I felt quite like if I did find it quite confusing because I'd not done it before, like, you know, like I practised a few times and then do the final one maybe like 10 times. And then, because you did listen to see what I said and my texts and all this, things like that, I was part of it as well. So I think a bit both.

DR: Do you think that during the process of co-designing your voice was heard?

PH: Yeah, you definitely listened to everything I said and the text I showed you and stuff.

DR: If you feel that you co-designed it; did the process help you to elicit an Emotional Experience on the textile?

PH: Well, yeah, I remember well... I don't know what was in my brain, but I remember some of the fabrics reminded me of, like, family stuff and I remember talking about my dad's partner. It's really weird, obviously. I think I don't know if it was before… it must have been before she passed... So it's weird I was talking about that situation with my dad a while ago. And so in terms of the yeah, I think I did obviously feel emotional stuff and choosing the text so that this text is in the piece here now. And at the time I felt really like attached to it in the sense of I felt like I was a horrible person. Because I wrote such like stern words complaining about something, and I felt quite guilty about that because then they reply really nicely. So I definitely think I kind of deliberately used that because I wanted to feel something.

DR: Do you think that this textile reflects your personality when you see and touch it?

PH: I mean visually, I could say, if I forget about what it says, visually, I could say maybe yeah because the pattern is so random, and yeah. I think visually maybe because it's a mix of things like lines and squares and stuff and I can be quite random, so maybe in that sense. But I'd like to think what it says does represent me. Because I think I'm a complainer, but it's just this specific thing was like the worst ever complaint I've ever made. And the reaction and I just felt really bad. So I'd like to hope is not a representation of me, to be honest.

DR: Do you think that during the experience of co-designing, you achieved a creative achievement throughout the process?

PH: Well I guess so in the sense of like I have no idea about, even though I'm from a fashion background, I didn't go into the weaving side of it. So I didn't know... I don't know about, you know, the computer, all the different names of things. I like the weaves and stuff, some of it I recognised. And I was like, oh yeah. Alpaca and other

fabrics obviously I know some materials. But... I guess I learnt that, I think. So in terms of achieving and knowledge and learning that stuff, I think that was good, definitely. And then creative achievement, I feel like most of this is, I know you've used my text and stuff and I chose the yarns and things, but I think you're the one who create the piece. So I'd say it's more of a career achievement for you because you've actually made it. But you've used my text is such a thing. It's like. Yeah, I guess is a kind of collaboration then, I guess. Yeah, yeah.

DR: The process of co-designing that I've been using in this research is computer-led co-design experience approach. Its definition is the democratic collaborative design approach in which the individual plays an active role via offline digital computer tools, where the individual is the beneficiary of the final output. Do you think that the process that you experience aligns with this definition?

PH: Yeah, Because you've outputted and my decisions and my choices. Even if sometimes I didn't fully understand why I was selecting, even though you try to explain it some, I definitely didn't fully get it, but I still selected it and had the choice, and then also the text was my choice. So I guess it yeah, in terms of that, that will be co-design. Yeah, because you're using me and what I think for what you're creating, yeah.

DR: Does the translation of text into a pattern, using the code that you selected, have a positive impact to the textile?

(The text selected was the one with emotional connection that Participant H wrote and the code was random code.)

PH: I thought it's more the translation of the text into a pattern has a positive impact on the text. I thought it's more that than the textile for me because the text is negative. If it was a positive text probably, I would say, yeah. But because I obviously associate this text with negativity. So it's more like putting a negativity into the textile makes the text and what I'm saying more positive because it's like a kind of reflective process. Obviously, like seeing it in the coding, in the textile. I like to look at it. OK, so if I think about it more and see the textile and the shiny bits and stuff like is like pretty positive. So it's like I think, I think they actually put in the negative feelings into the textile actually tries to shift the negative into positive emotions if you go… So I think that's quite nice.

DR: Does the materiality of the text – the text becomes a code, and then the code become a pattern, and the pattern becomes a textile – elicit an Emotional Experience?

PH: Yeah, the negative feelings I have then to the text and memories obviously put that into textile and then like I said before, I didn't, I couldn't remember what was in it. So once I remembered what was in it, it made me think and trigger like memories of negative stuff.

DR: Does the look of the code remind you of digital coding aesthetics on the textile?

PH: Yeah, I think where it's got the blocks and stuff that just look like coding. It is funny, isn't it, because obviously maybe the colour as well, because with coding normally like you, how you have it visually, you have it black and white. That's how I associate traditional coding. So the fact that this is like creamy colour, it just is it just throw you a bit like if it's black and white, I think I'll be way more like, oh my God yeah, that literally looks like coding. And that's just because of associations, isn't it? What I may perceive as coding, and what I know, which obviously it's not a lot... only basic knowledge of coding.

DR: Does knowing that the pattern is generated through digital coding by translating your text elicit an Emotional Experience?

PH: Yeah. It's what I was saying before about I want to know what it is. What text was it. And then that's, that was what changed it. Because when it was just a visual touch thing, I didn't feel as much. But then once I knew it was my text and it was my negative text and I was like oh yeah. And then that's when I can be like, I can imagine in my head and when I look at it.

DR: Does the text elicit in you Emotional Experience?

PH: Yeah. Once I knew what it says, because obviously I can't translate that from looking at it. But once I know you told me I could trust you to tell me that which text is and whether I have that knowledge.

DR: Would you change your text, yarns, weave, structures or in order to elicit Emotional Experience?

PH: I don't think so, because I felt like the fact that I chose a negative text, I feel more attached to it than if it was a positive or maybe because it's kind of like choosing the negative text. I don't like what I was like when I wrote that obviously. So it's more that I'm reflecting on myself and it reminds me not to be harsh when I'm complaining about stuff to not go in and go a bit harsh. So it's kind of like allowed me to... It's reminded me about something which I obviously try not to think about when you think about yourself, because you don't think about yourself in a bad light because you focus on the best thing. So it's kind of a good process of reflecting on yourself. And to know it's kind of made me think now before when I complain about stuff.

DR: Do you have anything else to add that you think it might benefit the research?

PH: Well, I don't know. Yeah. If you've gone down looking at the negative side, I don't know what you're doing. But I do know I was saying before about having people having a negative emotion like if I had depression or I'm sad or whatever my negative feeling is, then if I in the process of designing with you and putting it into this, it's

like, does that bring positive feelings that for me it maybe has reflected and given me more time to reflect on it in the process? But yet the people might have different views on that, but I mean that side of it. I don't know if you're looking at that, but I think that's also quite interesting when trying to change people's emotions from negative to positive through the design process and then the output. I think that it could even be at one end, could be the negative text, and then it flows and transitions into the positive and then can people feel that change like, you know, it's just like that. I think that would be interesting to experiment with.

DR: Thank you for your feedback and your collaboration during this research. Your participation has been of much value.

PH: Thanks.

7.9. APPENDIX H: SCOTWEAVE FILES CO-DESIGNED TEXTILE SAMPLES

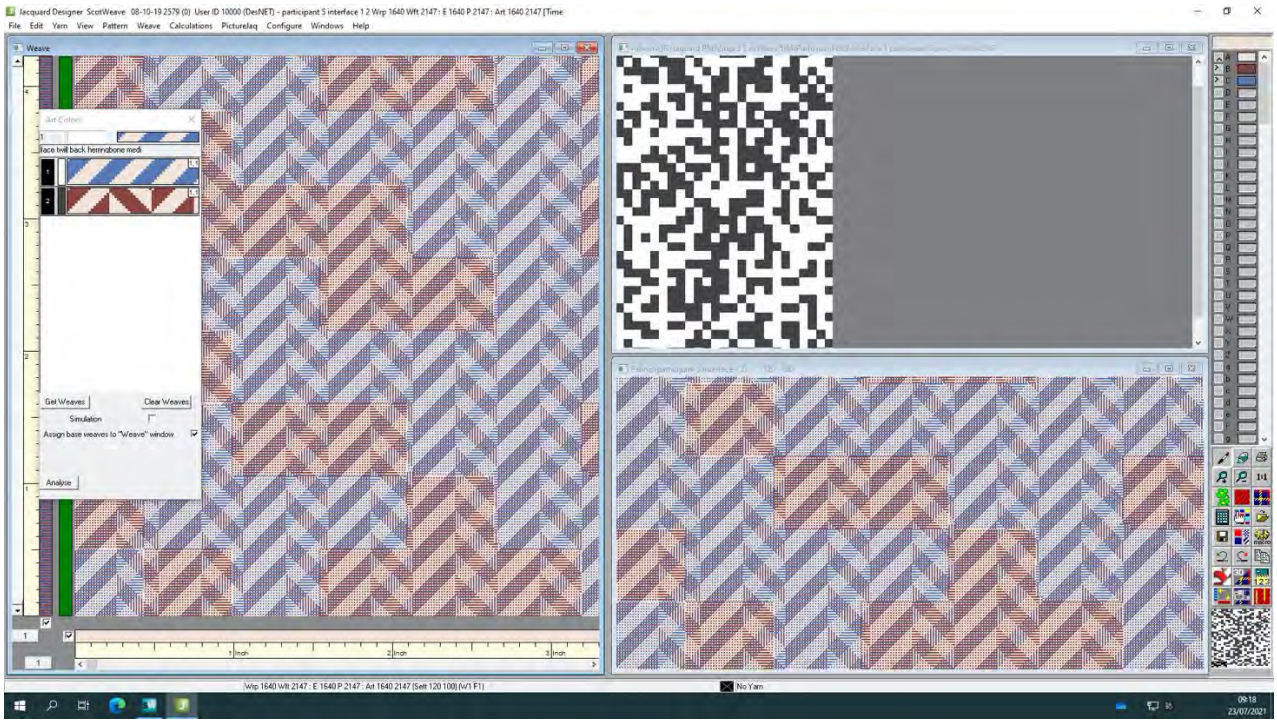


Figure 7. 34.ScotWeave file for Participant A co-designed textile sample one.

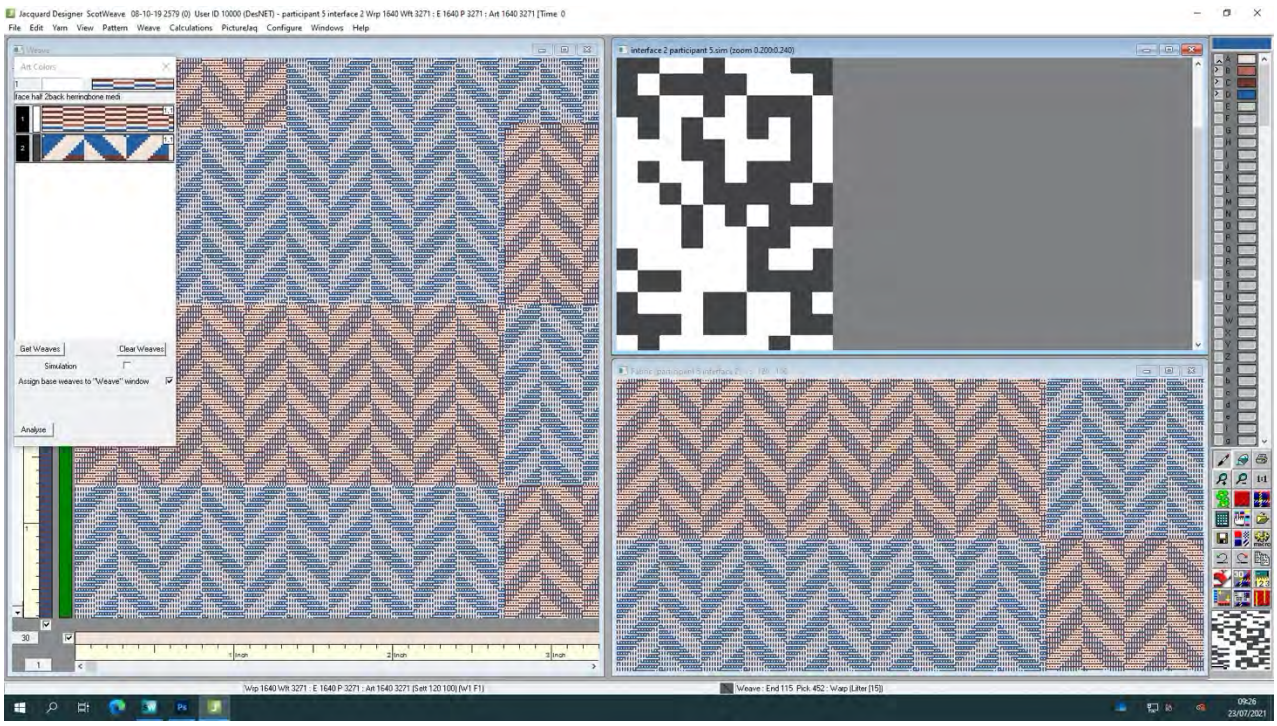


Figure 7. 35. ScotWeave file for Participant A co-designed textile sample two.

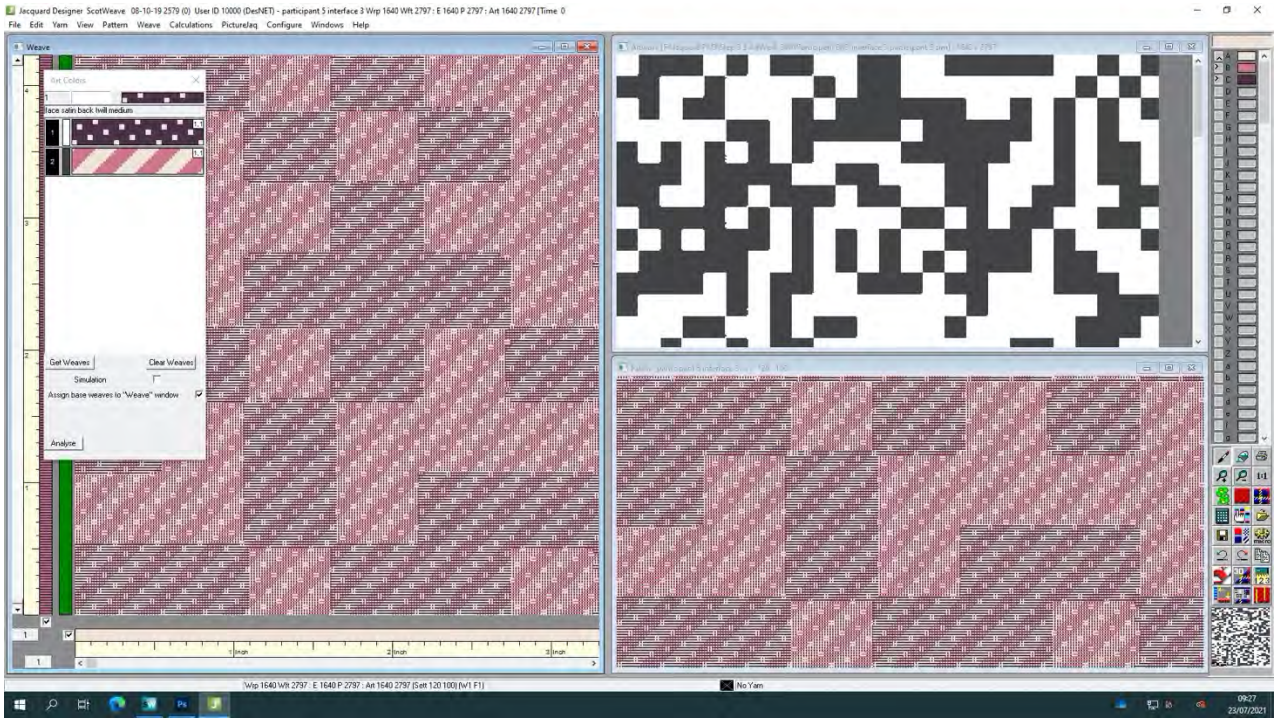


Figure 7. 36. ScotWeave file for Participant A co-designed textile sample three.

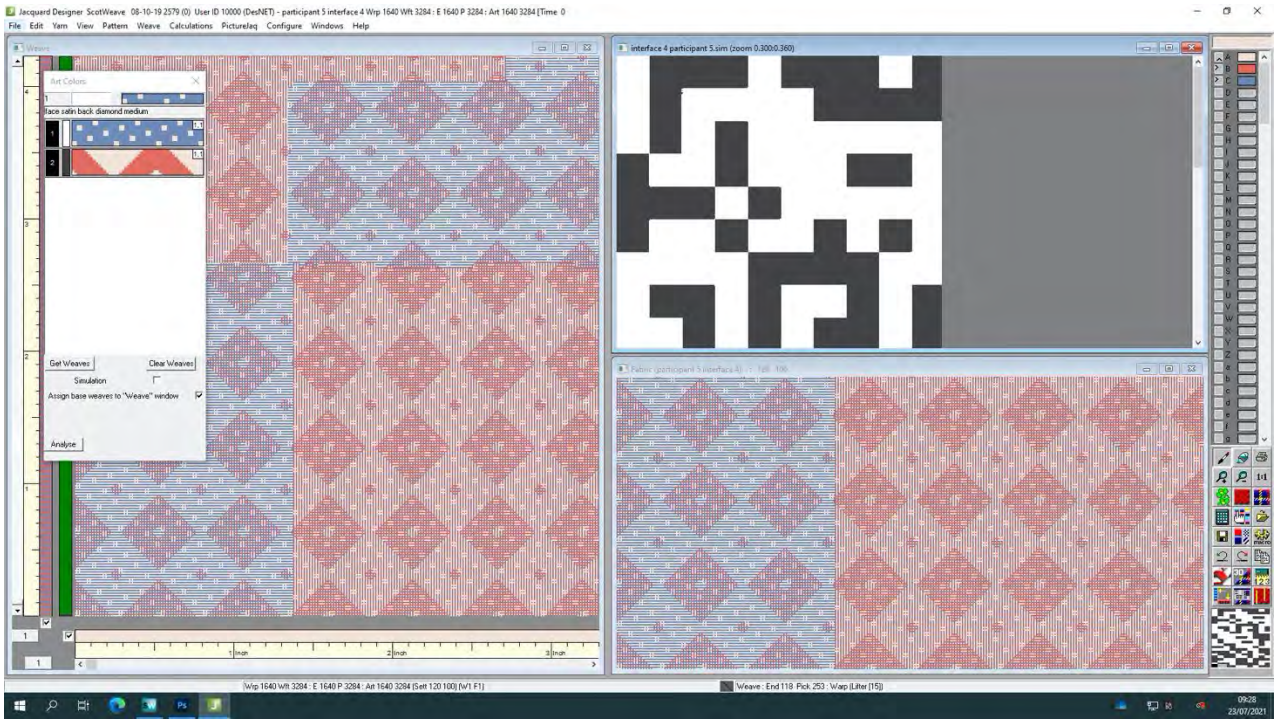


Figure 7. 37. ScotWeave file for Participant A co-designed textile sample four.

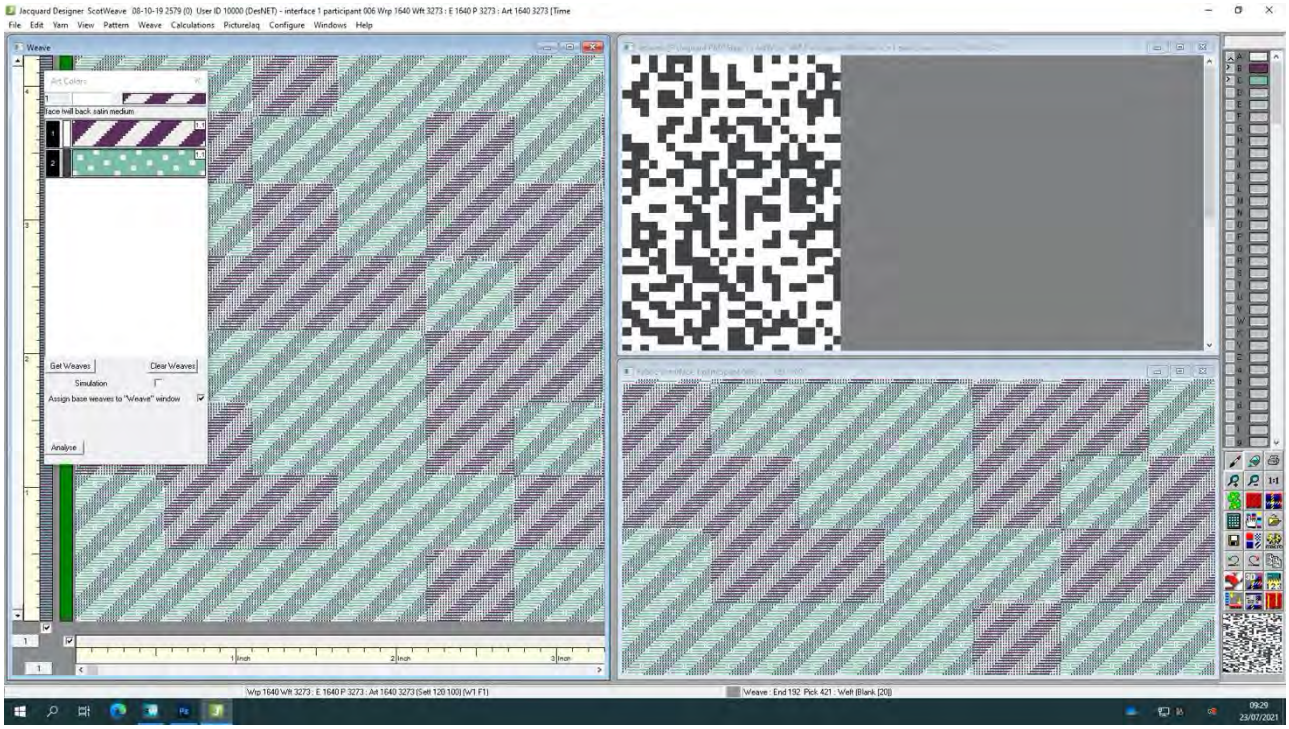


Figure 7. 38. ScotWeave file for Participant B co-designed textile sample one.

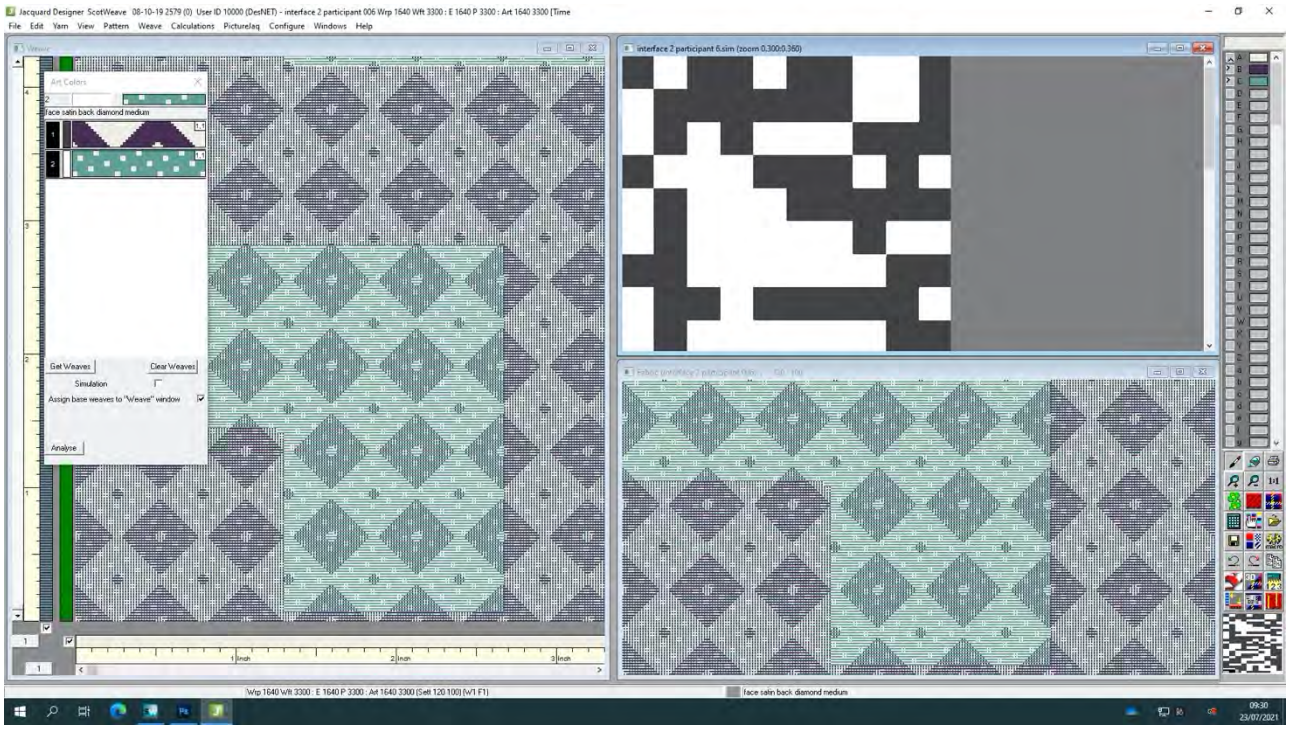


Figure 7. 39. ScotWeave file for Participant B co-designed textile sample two.

Figure 7. 40. ScotWeave file for Participant B co-designed textile sample three.

Figure 7. 41. ScotWeave file for Participant B co-designed textile sample four.

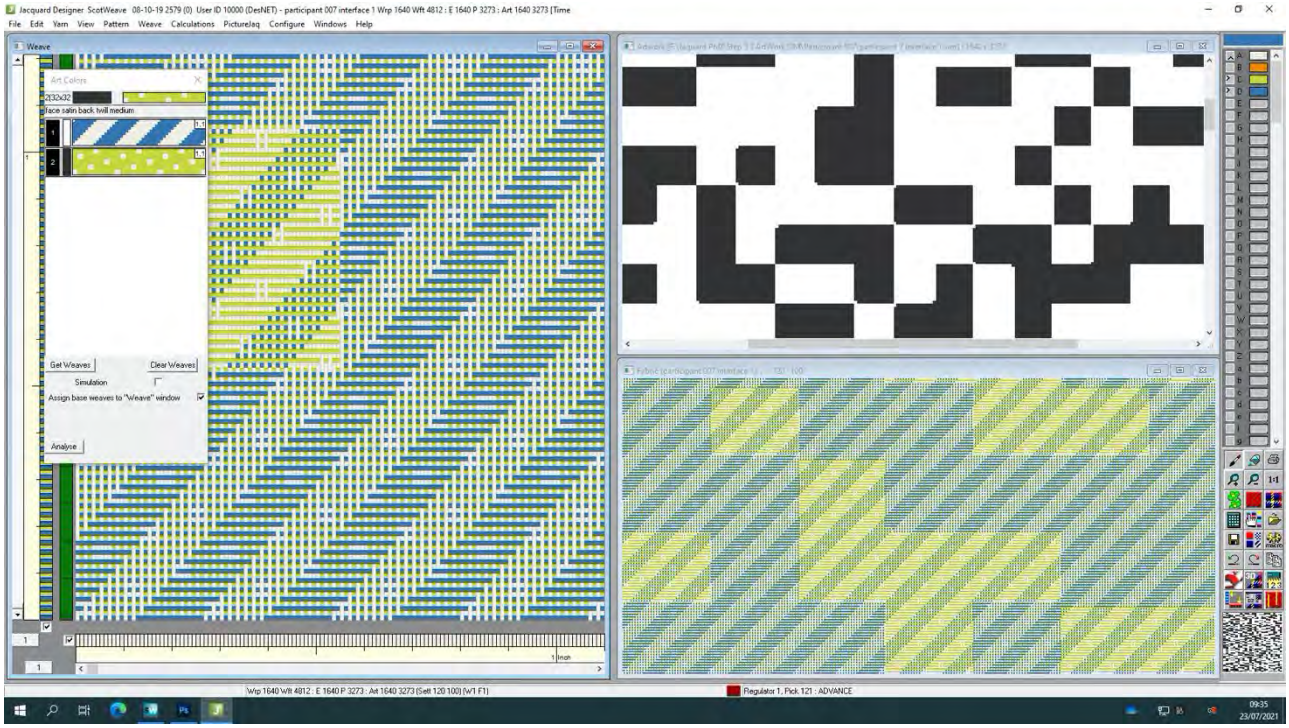


Figure 7. 42. ScotWeave file for Participant C co-designed textile sample one.

Figure 7. 43. ScotWeave file for Participant C co-designed textile sample two.

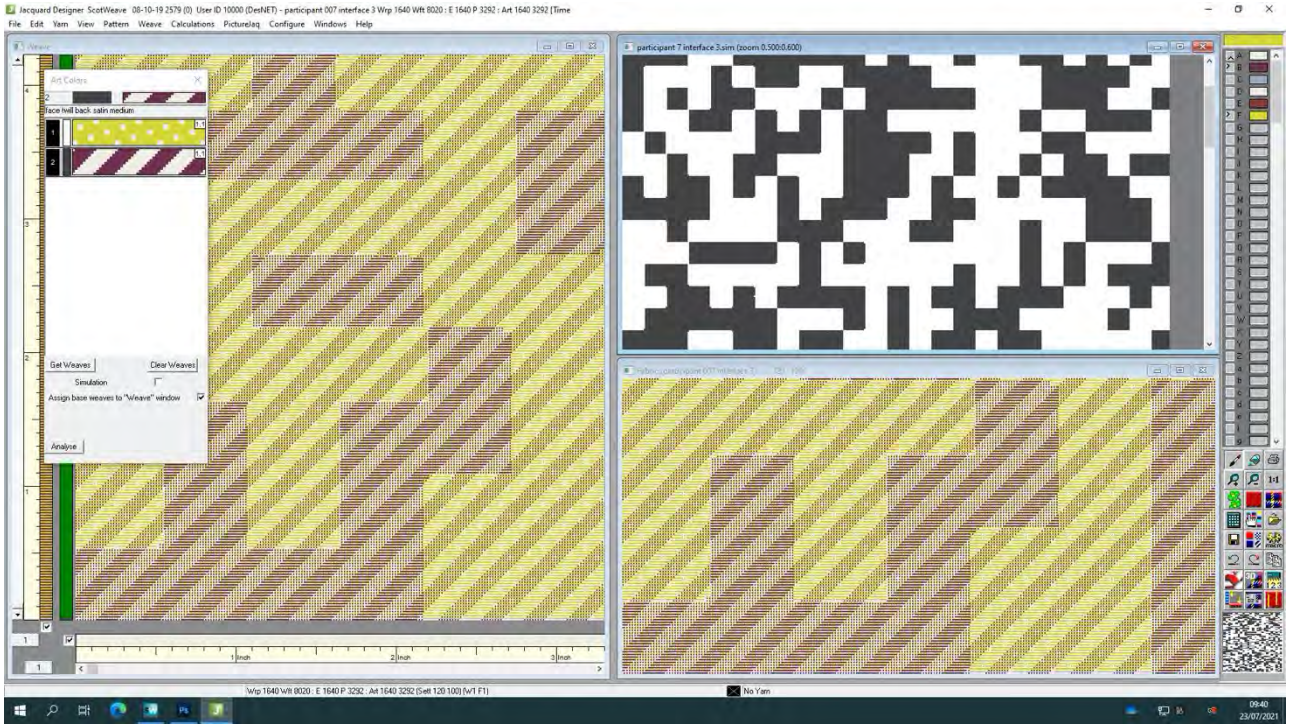


Figure 7. 44. ScotWeave file for Participant C co-designed textile sample three.

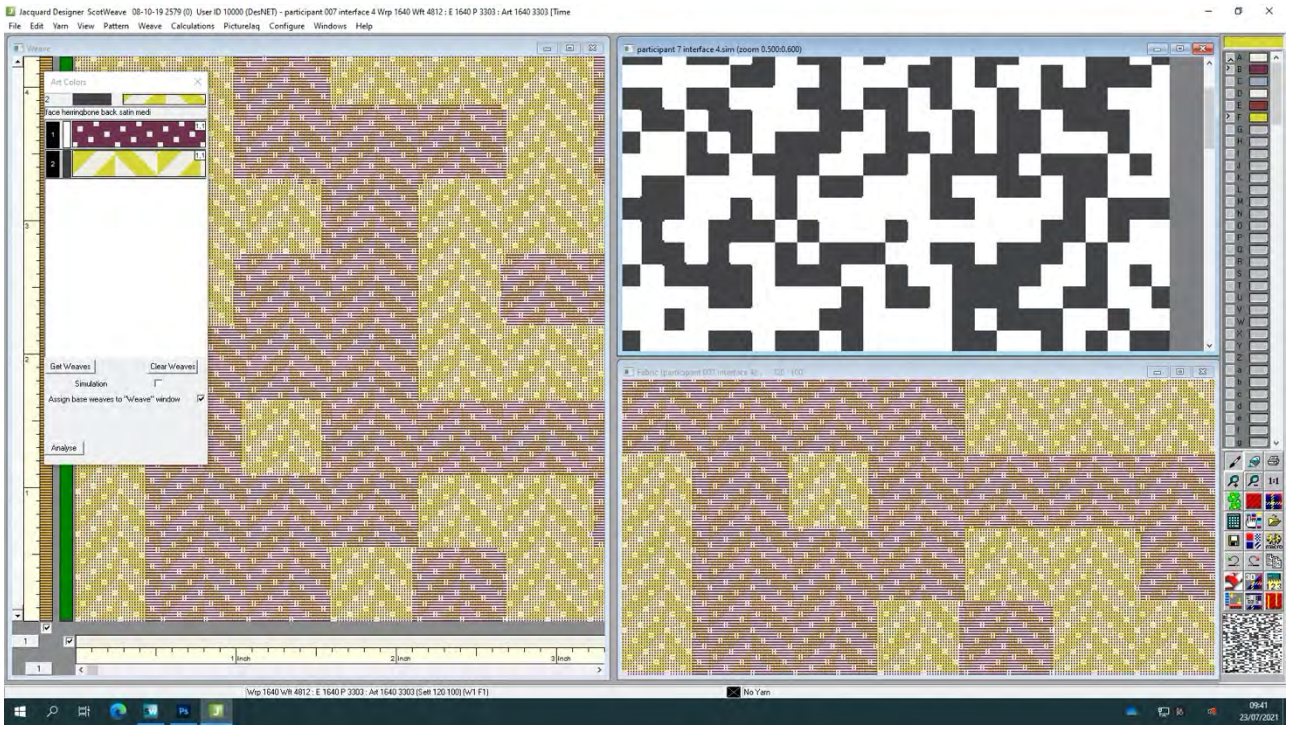


Figure 7. 45. ScotWeave file for Participant C co-designed textile sample four.

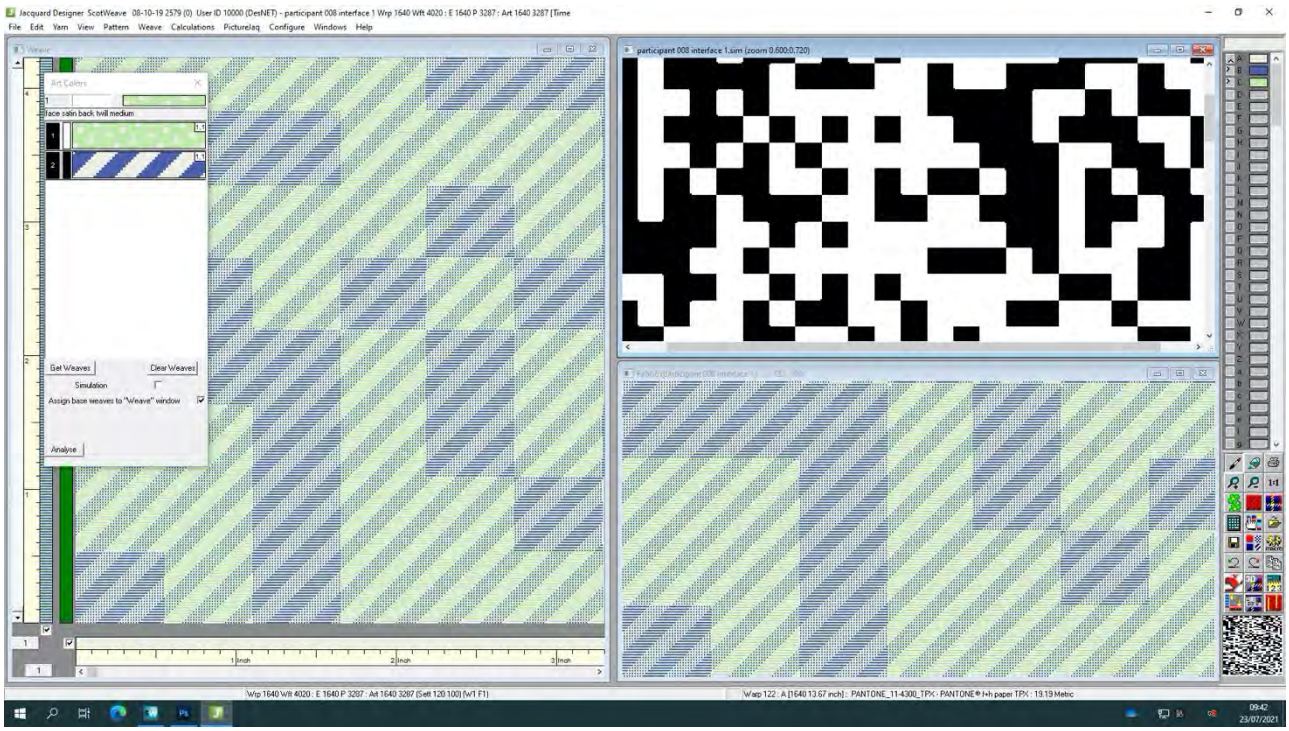


Figure 7. 46. ScotWeave file for Participant D co-designed textile sample one.

Figure 7. 47. ScotWeave file for Participant D co-designed textile sample two.

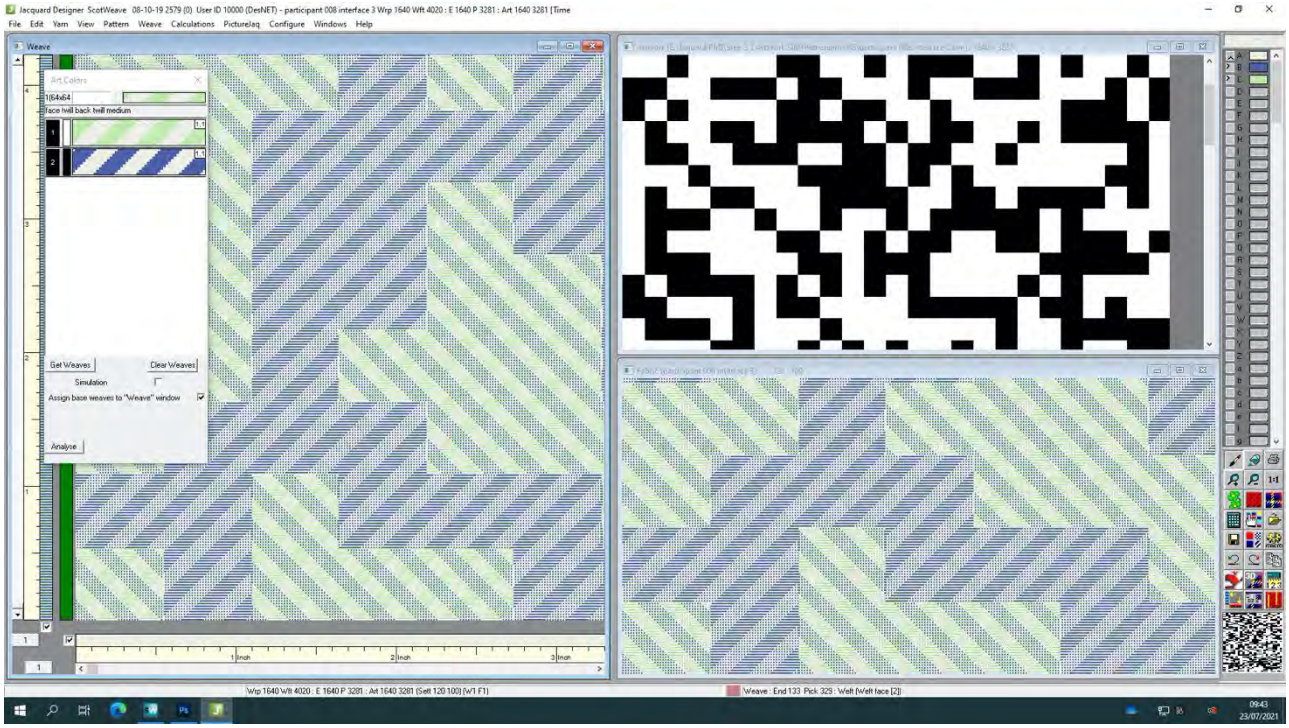


Figure 7. 48. ScotWeave file for Participant D co-designed textile sample three.

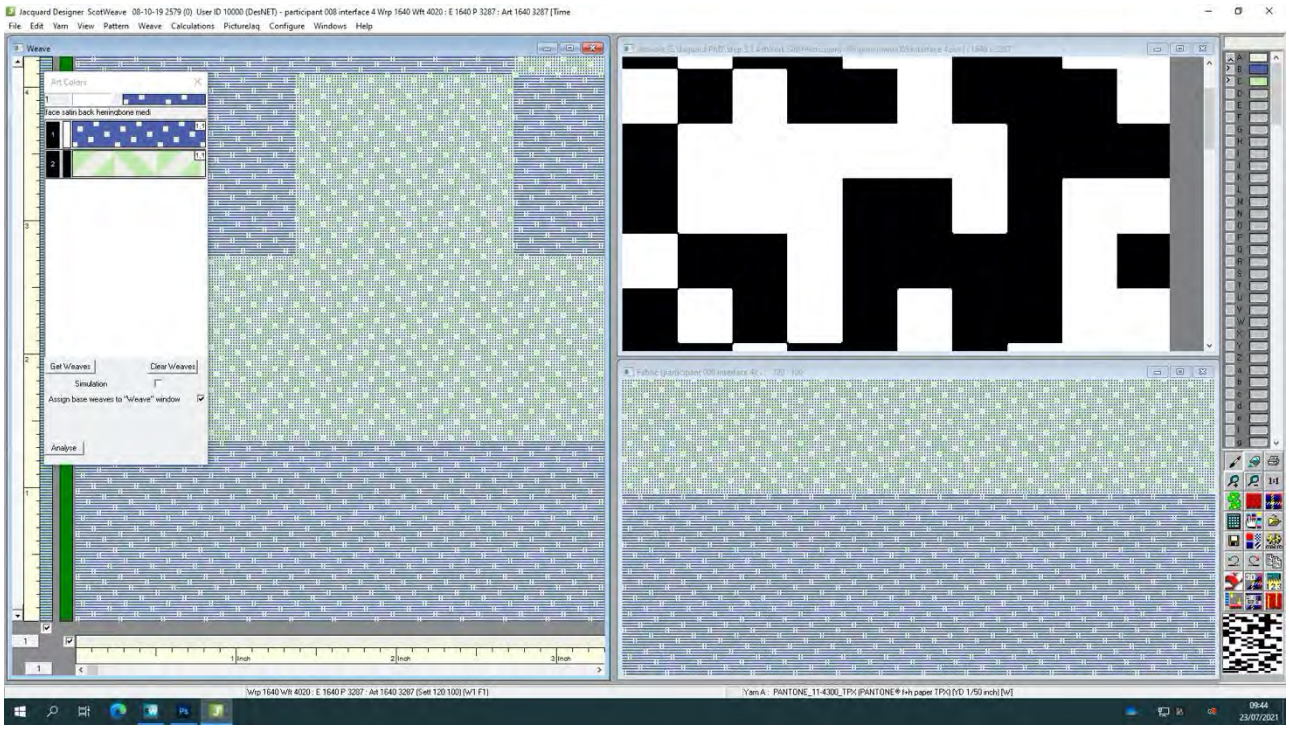


Figure 7. 49. ScotWeave file for Participant D co-designed textile sample four.

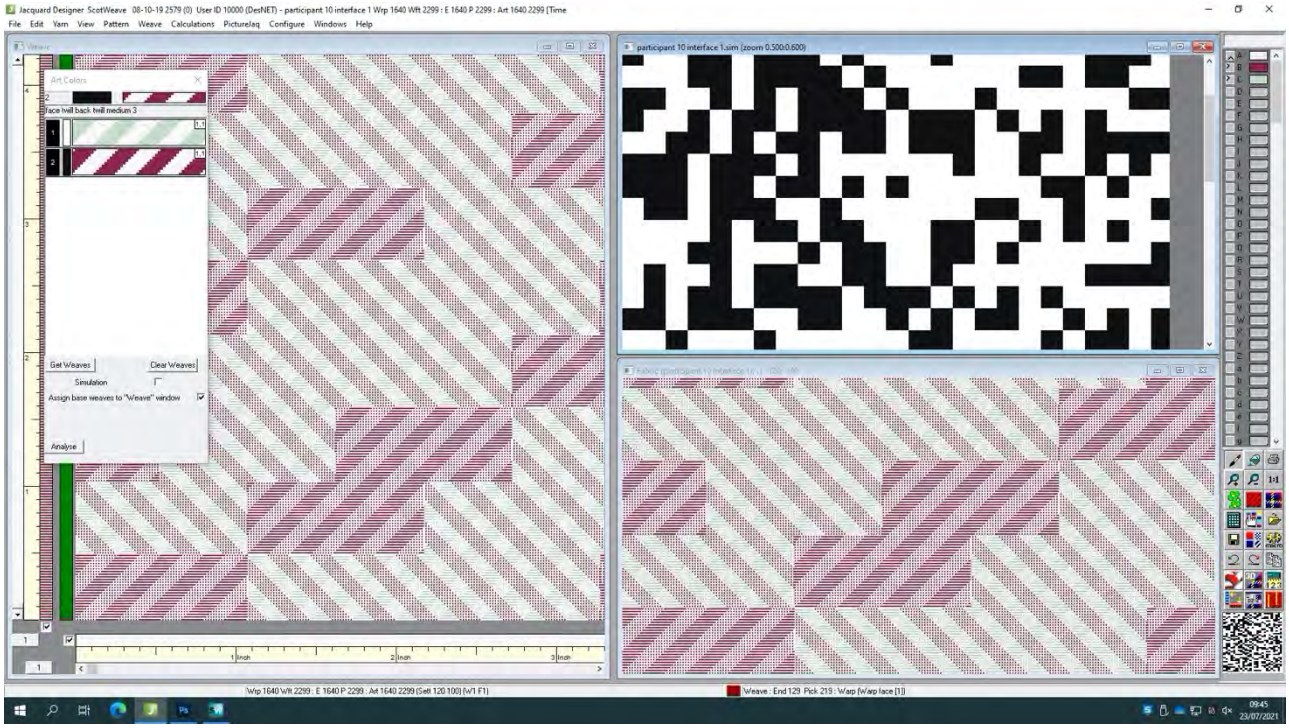


Figure 7. 50. ScotWeave file for Participant E co-designed textile sample one.

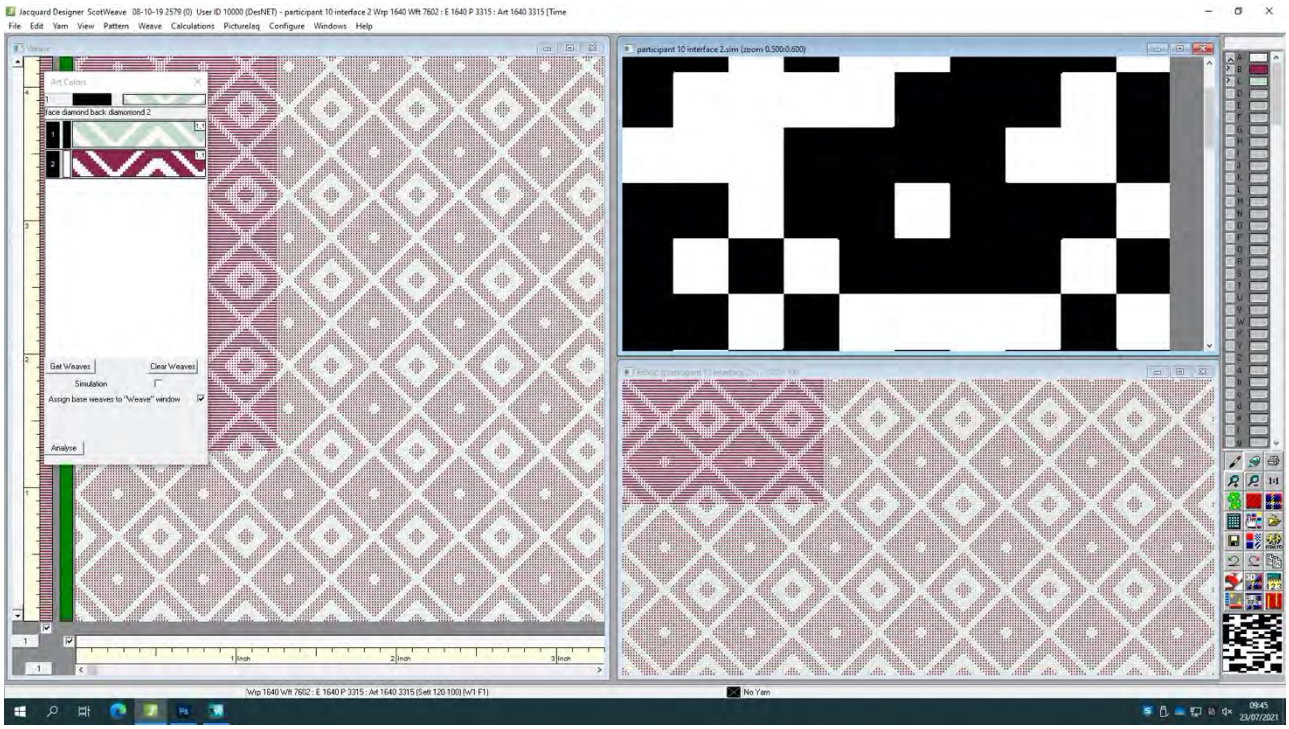


Figure 7. 51. ScotWeave file for Participant E co-designed textile sample two.

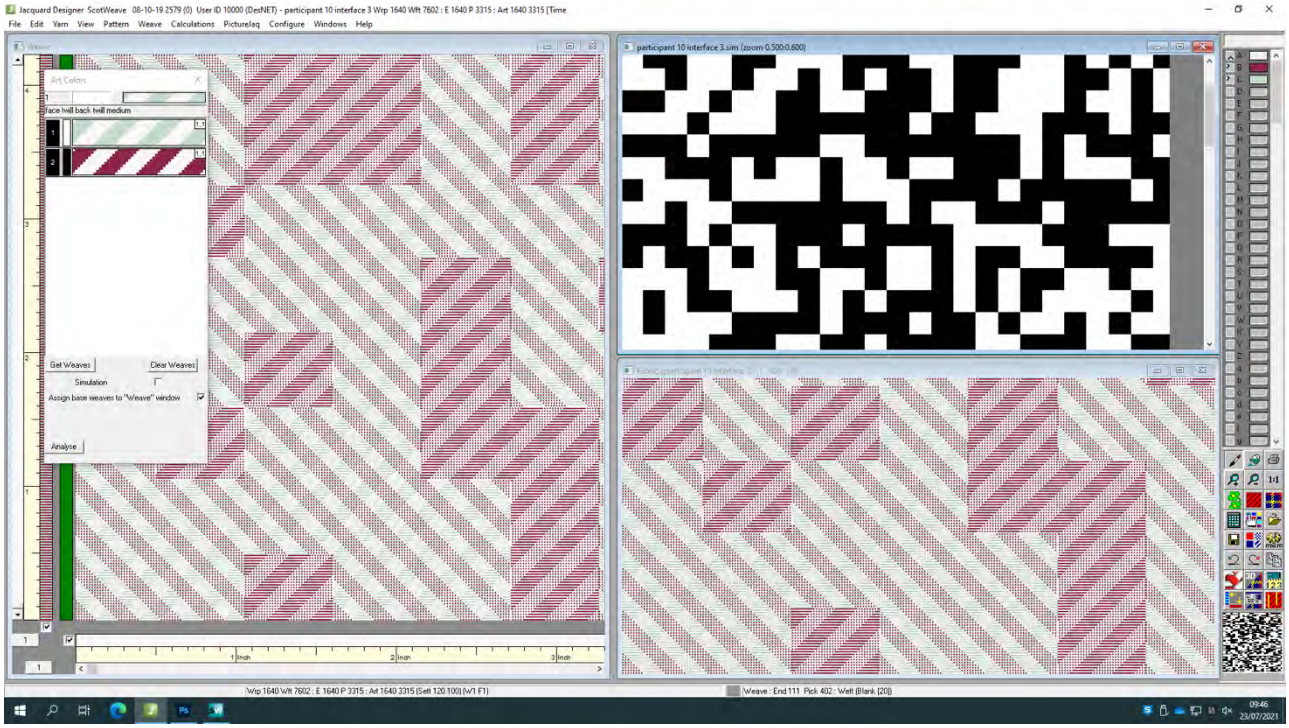


Figure 7. 52. ScotWeave file for Participant E co-designed textile sample three.

Figure 7. 53. ScotWeave file for Participant E co-designed textile sample four.

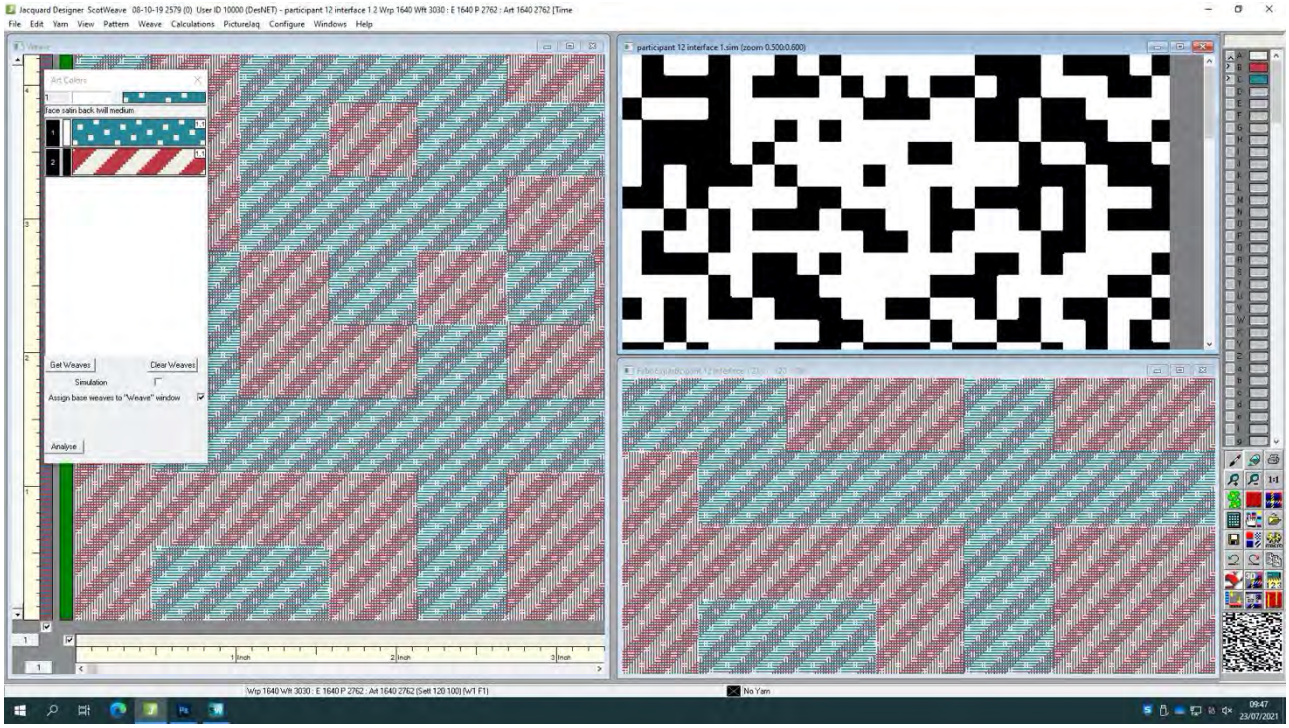


Figure 7. 54. ScotWeave file for Participant F co-designed textile sample one.

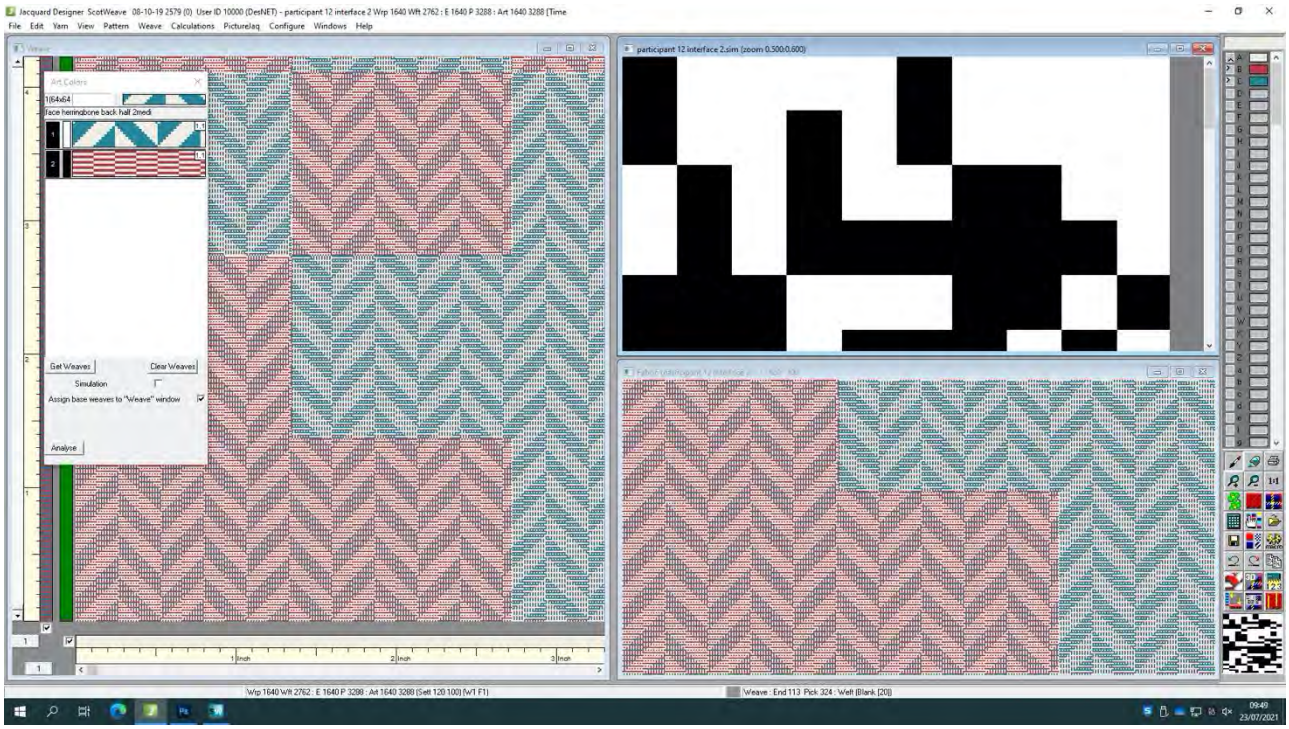


Figure 7. 55. ScotWeave file for Participant F co-designed textile sample two.

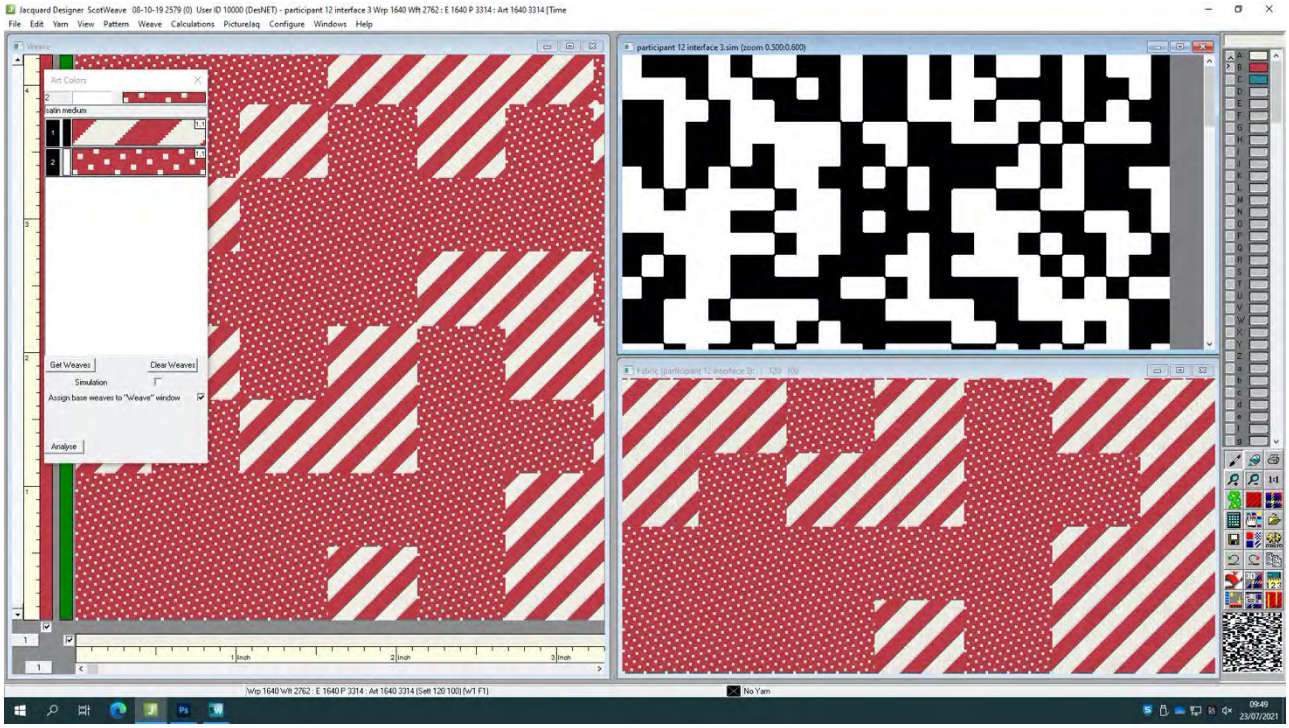


Figure 7. 56. ScotWeave file for Participant F co-designed textile sample three.

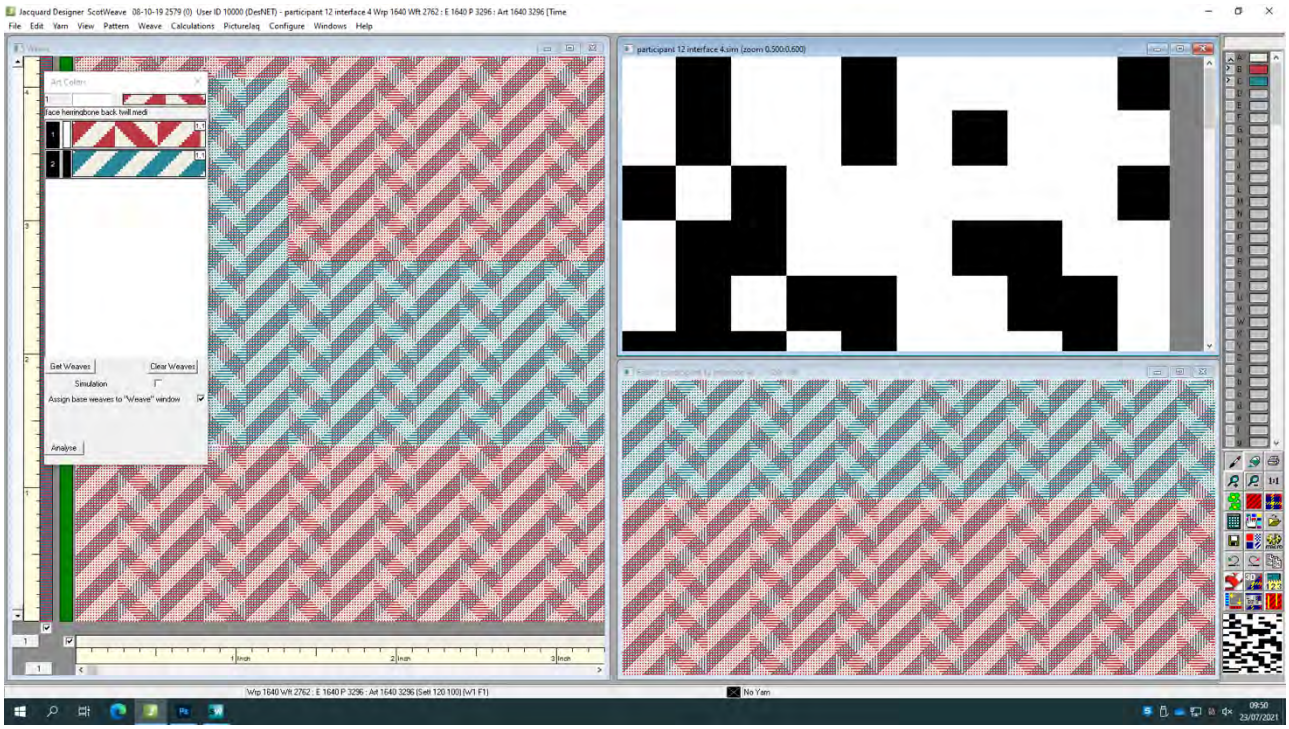


Figure 7. 57. ScotWeave file for Participant F co-designed textile sample four.

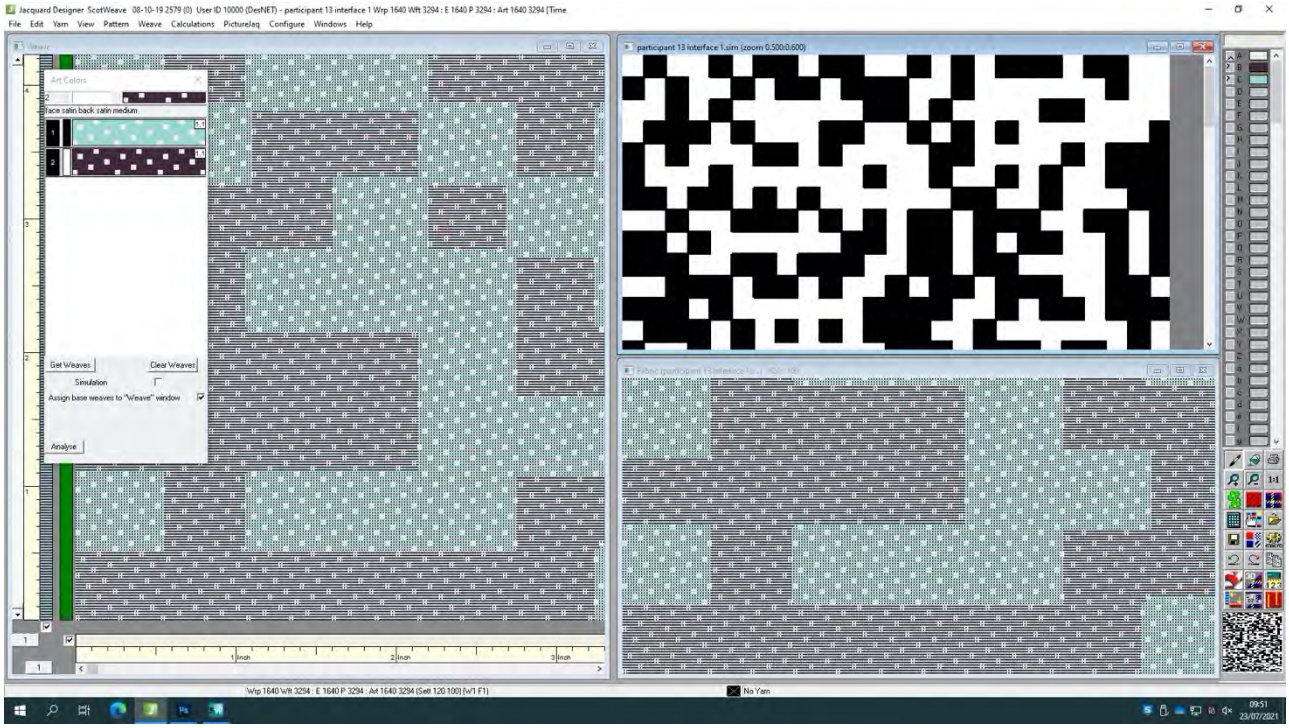


Figure 7. 58. ScotWeave file for Participant G co-designed textile sample one.

Figure 7. 59. ScotWeave file for Participant G co-designed textile sample two.

Figure 7. 60. ScotWeave file for Participant G co-designed textile sample three.

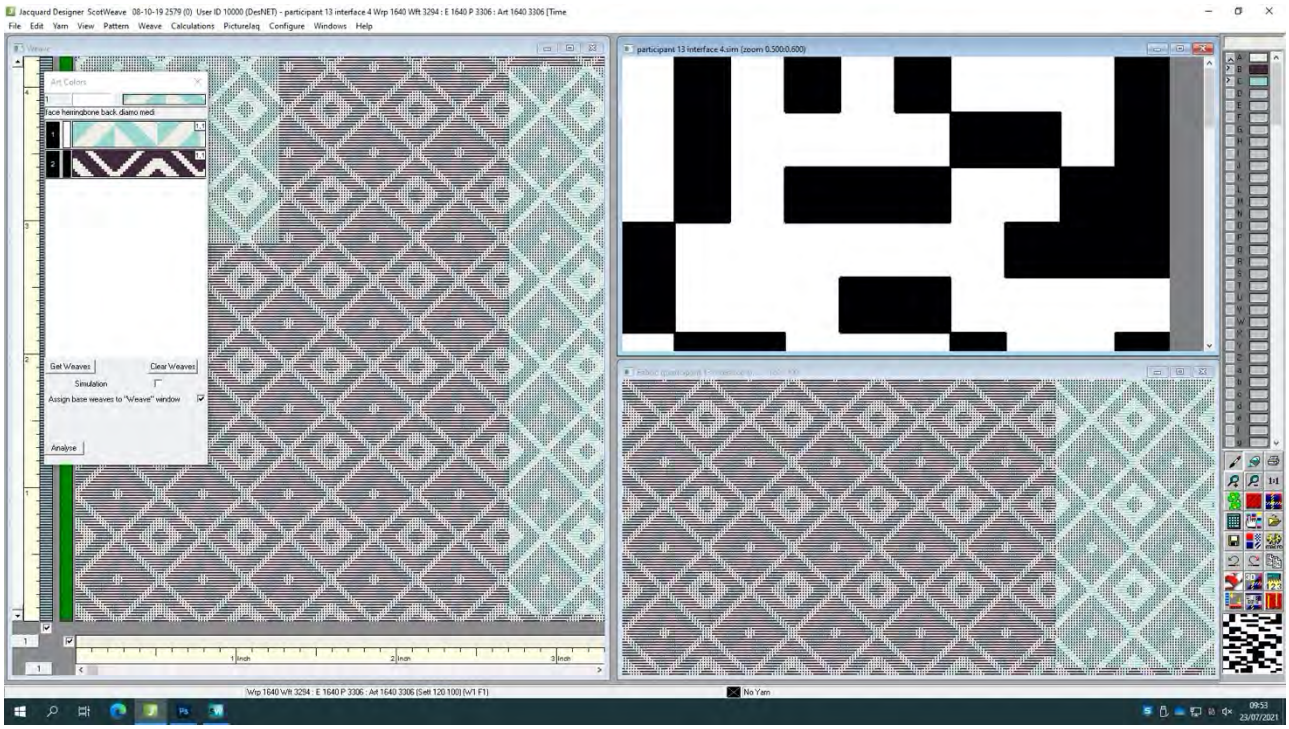


Figure 7. 61. ScotWeave file for Participant G co-designed textile sample four.

Figure 7. 62. ScotWeave file for Participant H co-designed textile sample one.

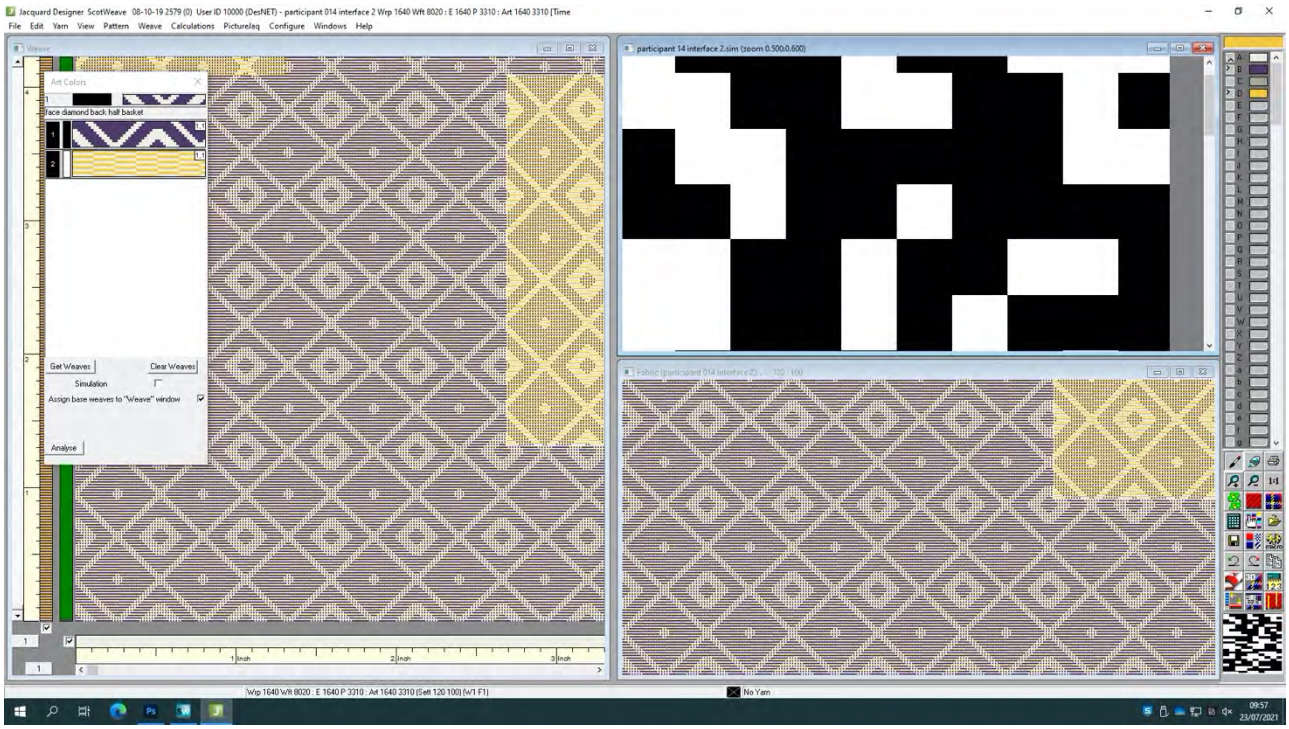


Figure 7. 63. ScotWeave file for Participant H co-designed textile sample two.

Figure 7. 64. ScotWeave file for Participant H co-designed textile sample three.

Figure 7. 65. ScotWeave file for Participant H co-designed textile sample four.

7.10. APPENDIX I: CO-DESIGNED TEXTILE SAMPLES AND TEXT

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE ONE:

Figure 7. 66. Participant A co-designed textile sample one.

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection):

Cassandra' does not mean revolution. It means to survive. To defy all odds. To hold a dying legacy in both hands and refuel it

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE TWO:

Figure 7. 67. Participant A co-designed textile sample two.

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

No doubt, endings are hard. But then again, nothing ever really ends, does it?

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE THREE:

Figure 7. 68. Participant A co-designed textile sample three.

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE THREE TEXT (Read with emotional connection):

The changing relationship between Macbeth and Lady Macbeth highlights the theme of ambition, as both want to be powerful in their own ways.

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 69. Participant A co-designed textile sample four.

PARTICIPANT A CO-DESIGNED TEXTILE SAMPLE FOUR TEXT (Read without emotional connection):

[data lost due to unforeseen circumstances]

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE ONE:

Figure 7. 70. Participant B co-designed textile sample one.

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection):

WATER is Wales **asset** – it's been a controversial topic for many years due to its political stance across the nation.

This is because of circumstances such as the flooding of CAPEL CELYN.

The flooding of Capel Celyn was took place in the 1960's to supply water for the city of Liverpool.

People across all parties voted against this bill but Liverpool city council and the government in West Minister did not accept these actions. Many marches took place in Liverpool over the flooding.

It is a symbol of domination of the English nation over the Welsh nation and its heritage – where Capel Celyn was the last remaining only welsh speaking village in Wales and it was felt that this was an attack on our nation.

Places such as the Lake District weren't used as West Minister considered it to be of outstanding natural beauty – yet Wales is also considered as this??

DISTORTION- Distortion is seen within this as inaccurate information given at the time by Liverpool City Council. In 2005 it was proven that the water in the reservoir was never used and that flooding disbursed and dismantled the welsh community. An inaccurate picture was given creating a bad feeling between the welsh and English nation.

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE TWO:

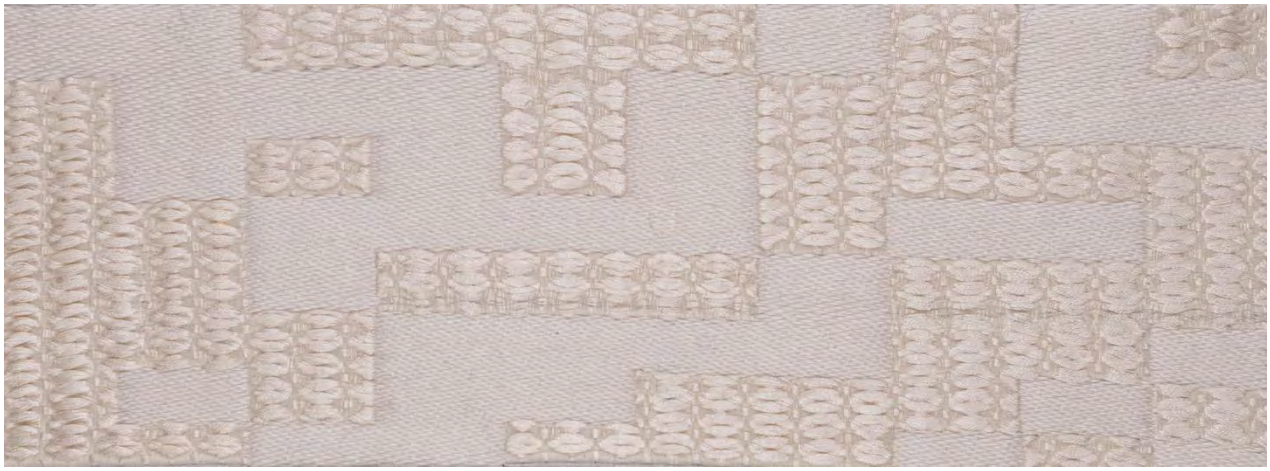


Figure 7. 71. Participant B co-designed textile sample two.

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

Due to personal circumstances, please accept this letter as notice of my resignation from the position of Retail Assistant at H&M Trafford Centre.

Unfortunately, I have had postponed University and placement for a little while and have decided to leave H&M as a result. Because of this I am unable to complete my shift on the weekend (30th and 31st March) as per the terms of my employment contract.

I am thankful for the opportunities you have given me during my time here and I am sad to leave due to such horrible circumstances.

I hope that I can rely on you for a positive reference in future.

Yours sincerely

Manon Emmanuel

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE THREE:

Figure 7. 72. Participant B co-designed textile sample three.

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE THREE TEXT (Read with emotional connection):

"Where's Papa going with the ax?" said Fern to her mother asthey were setting the Table for breakfast.

"Out to the hoghouse," replied Mrs. Arable. "Some pigs were bornlast night.""I don't see why he needs an ax," continued Fern, who was onlyeight.

"Well," said her mother, "one of the pigs is a runt. It's verysmall and weak, and it will never amount to anything. So your fatherhas decided to do away with it.""Do away with it?" shrieked Fern. "You mean kill it? Justbecause it's smaller than the others?"Mrs. Arable put a pitcher of cream on the Table. "Don't yell,Fern!" she said. "Your father is right. The pig would probably dieanyway."Fern pushed a chair out of the way and ran outdoors. The grasswas wet

and the earth smelled of springtime. Fern's sneakers weresopping by the time she caught up with her father.

"Please don't kill it!" she sobbed. "It's unfair."Mr. Arable stopped walking.

"Fern," he said gently, "you will have to learn to controlyourself.""Control myself?" yelled Fern. "This is a matter of life anddeath, and you talk about controlling myself." Tears ran down hercheeks and she took hold of the ax and tried to pull it out of herfather's hand.

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 73. Participant B co-designed textile sample four.

PARTICIPANT B CO-DESIGNED TEXTILE SAMPLE ONE FOUR (Read without emotional connection):

A Poison Tree by William Blake

I was angry with my friend;
I told my wrath, my wrath did end.
I was angry with my foe:
I told it not, my wrath did grow.

And I waterd it in fears,
Night & morning with my tears:
And I sunned it with smiles,
And with soft deceitful wiles.

And it grew both day and night,
Till it bore an apple bright.
And my foe beheld it shine,
And he knew that it was mine.

And into my garden stole.

When the night had veiled the pole;
In the morning glad I see,
My foe outstretchd beneath the tree.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE ONE:

Figure 7. 74. Participant C co-designed textile sample one.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection):

Although written only a decade ago, the issues Chochinov's manifesto addresses have worsened since its publication, and despite it being profoundly significant and appropriate to the current generation of designers, I cannot help but sense many are still not listening. Some progress is being made and there are now numerous designers and makers fighting the earth's corner, but I question if it is enough to compensate for years and years of damage and destruction. Lack of research funding, poor media coverage and our habitual underestimation of the threat are all culpable for the lack of advancement in solving the issue. Design in the 21st century is not simply for the present, but equally the future. Nowadays, designers need not think solely about a product's function and form, but about its environmental impact, its longevity and its disposal. If we have any prospect of reaching our 60's, it is up to designers, makers and consumers to design, make, shop and *live* responsibly, encouraging industry and government to follow suit.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE TWO:

Figure 7. 75. Participant C co-designed textile sample two.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

Creativity requires tenacity. Most of your accomplishments will be demonstrations of resolve, not talent. When you get lost, learn to carve a new path. When the darkness closes in, learn to kindle the light. When you can't see things clearly, learn to look through the eyes of others. Every set of adverse conditions in the act of creation can lead to a broader set of skills. The rewards for perseverance are always waiting just on the other side of what we think is impossible.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE THREE:

Figure 7. 76. Participant C co-designed textile sample three.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE THREE TEXT (Read with emotional connection):

The Design Society is looking for a (team of) designer(s) to create a visual identity, assist in designing our quarterly zine and produce promotional material for our events. The Design Society is a community that brings together students from different design departments to challenge disciplinary boundaries, share ideas, build creative networks and celebrate design in its many forms. Our focus on challenging disciplinary boundaries allows our visual identity to be imaginative, inventive, and innovative. Your logo could be two-dimensional, three-dimensional, digital, drawn, painted, sculpted, stamped, woven, sewn, and created using any material(s). We only ask that the logo reads ‘Design Society’, but you will ultimately have creative freedom over its design.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 77. Participant C co-designed textile sample four.

PARTICIPANT C CO-DESIGNED TEXTILE SAMPLE FOUR TEXT (Read without emotional connection):

Several academic disciplines, notably art history and archaeology, routinely work with artefacts and methodological expertise. Work done in these fields is often directed inward, towards the accumulation and explication of information required by the discipline itself. In the history of art this takes the form of resolving questions of stylistic and iconographic influence, or dating and authorship, of quality and authenticity. In archaeology it is the basic task of assembling, sorting dating and quantifying the assembled data.

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE ONE:

Figure 7. 78. Participant D co-designed textile sample one.

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection):

Morning Chris, I'm sorry you're seemingly in the middle of another exhausting weird period in the continuing saga of Matt and Jess. I don't like it and didn't intend for you to be a go-between. I think I'm going to leave things as they are for now

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE TWO:

Figure 7. 79. Participant D co-designed textile sample two.

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

Morning Richard, I did a bunch of testing last night – completely rebuilt the whole section, by itself, as a test (please see it on Email on Acid). Did multiple tests on multiple devices. Tore my hair out several times over

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE THREE:

Figure 7. 80. Participant D co-designed textile sample three.

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE THREE TEXT (Read with emotional connection):

London’s East End Film Festival (EEFF) has been forced to close all operations with immediate effect due to a lack of funding. The annual event ran from 2000 to 2018, attracting 30,000 attendees each year.

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 81. Participant D co-designed textile sample four.

PARTICIPANT D CO-DESIGNED TEXTILE SAMPLE FOUR TEXT (Read without emotional connection):

Even though COVID-19 has already hurt Apple’s bottom line and forced the company to temporarily close stores in China, according to a new report, the coronavirus hasn’t put any dampers

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE ONE:

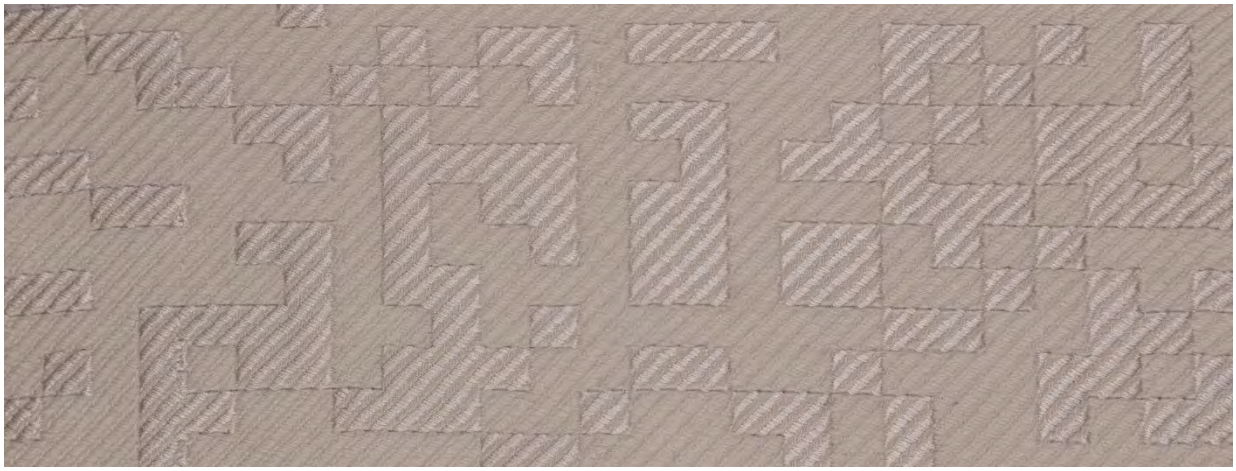


Figure 7. 82. Participant E co-designed textile sample one.

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection):

Hey James, just to let you know I'm in dale 13 if you need anything just let me know even if its just a friendly face im always here

Anja

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE TWO:

Figure 7. 83. Participant E co-designed textile sample two.

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

Hi Joe,

We've been looking at trains for BUCS XC, were looking at getting the 08;47 train out on the 31st of January and then returning on Sunday 2nd of feb at 10;15am totalling a price around $75.80 with a rail card. The link is below

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE THREE:

Figure 7. 84. Participant E co-designed textile sample three.

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE THREE TEXT (Read with emotional connection):

if I were a butterfly

id thank you lord for giving me wings

and if I were a robin in a tree

id thank you lord that I could sing

and if I were a fish in the sea

id wiggle my tail and id giggle with glee

but I just thank you father

for making me me

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 85. Participant E co-designed textile sample four.

PARTICIPANT E CO-DESIGNED TEXTILE SAMPLE FOUR TEXT (Read without emotional connection):

no joining fee at the gym Manchester Deansgate ends midnight @https://bit.ly/.2jdhwmn to optout txt STOP to 6118

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE ONE:

Figure 7. 86. Participant F co-designed textile sample one.

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection):

I would say no but whatever has happened between us over the last couple of months has definitely changed our relationship and we've definitely become a lot closer.

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE TWO:

Figure 7. 87. Participant F co-designed textile sample two.

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

I would just send it if it didn’t take too long just so they wouldn’t start paying too much attention and find out what you’re actually doing everyday

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE THREE:

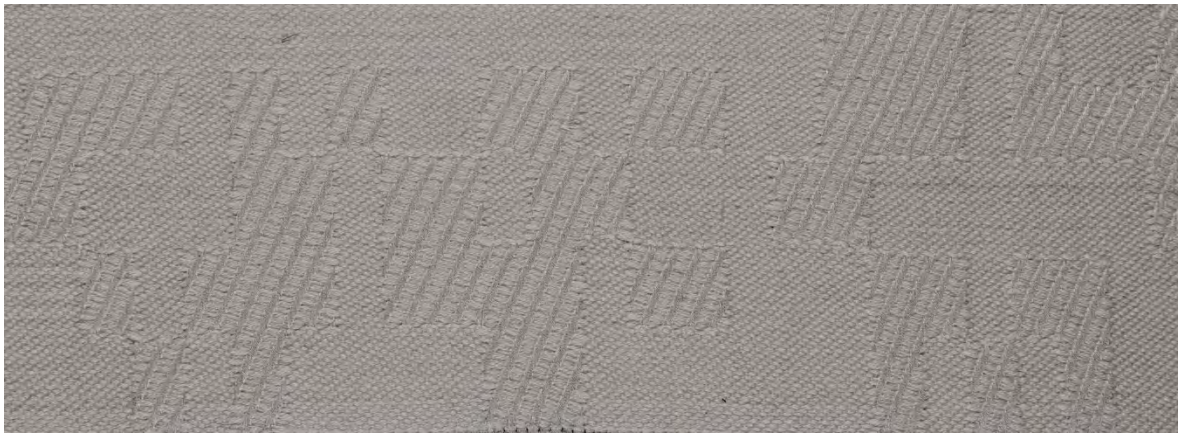


Figure 7. 88. Participant F co-designed textile sample three.

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE THREE TEXT (Read with emotional connection):

Look I’m sorry if I’ve been a go that wasn’t my intention and truthfully I wasn’t saying it in a having a go way. I guess its just been a little difficult coz when it happened it was all good and them bam

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 89. Participant F co-designed textile sample four.

PARTICIPANT F CO-DESIGNED TEXTILE SAMPLE FOUR TEXT (Read without emotional connection):

Hi! Left you a voice message but just realized you are in America. Have a fab time!

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE ONE:

Figure 7. 90. Participant G co-designed textile sample one.

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection)::

Kevin I hate that I’m drunk messaging you. I will die tomorrow. I deleted your number so I couldn’t message you. I respect your decision but I’m also still quite sad. I just wanted you to be honest. You don’t have to bring the hackney.

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE TWO:

Figure 7. 91. Participant G co-designed textile sample two.

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

In winter people where sunglasses for very different reasons, comprising of but not limited to being hungover, feeling shy or being the victim of assault. In summer people where them because of the sun.

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE THREE:

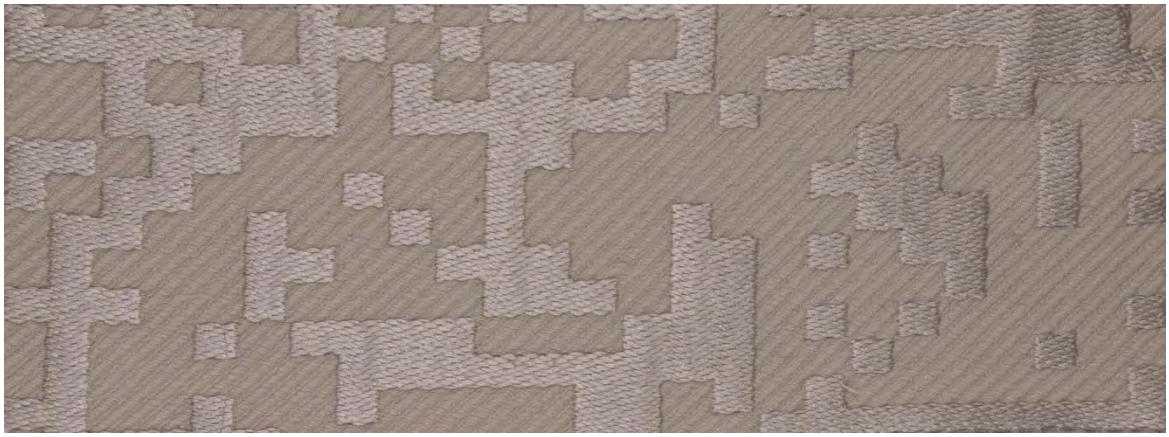


Figure 7. 92. Participant G co-designed textile sample three.

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE ONE THREE (Read with emotional connection):

Hey Rozz hope you’re well I have a bit of sad news unfortunately Liam passed away on Saturday Wayne contacted Alex today to let him know Sorry I haven’t messaged sooner :(

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 93. Participant G co-designed textile sample four.

PARTICIPANT G CO-DESIGNED TEXTILE SAMPLE ONE FOUR (Read without emotional connection):

This Table contains an electrical supply for you. Avoid drinks and other liquids. DO not move this Table – it is connected to an electrical supply.

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE ONE:

Figure 7. 94. Participant H co-designed textile sample one.

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE ONE TEXT (Written with emotional connection):

I am requesting a full refund for your complete negligence and due to this I would actually never return to this festival nor advertise to others to attend, as this it's highly and utterly disappointing.

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE TWO:

Figure 7. 95. Participant H co-designed textile sample two.

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE TWO TEXT (Written without emotional connection):

Hi Leanne, thank you. I am out of the country on the 27th January, so please can I book in for the 2nd march at 1pm session if that's okay? I guess it's the below session: Monday 2nd march 2020 at 1.00pm

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE THREE:

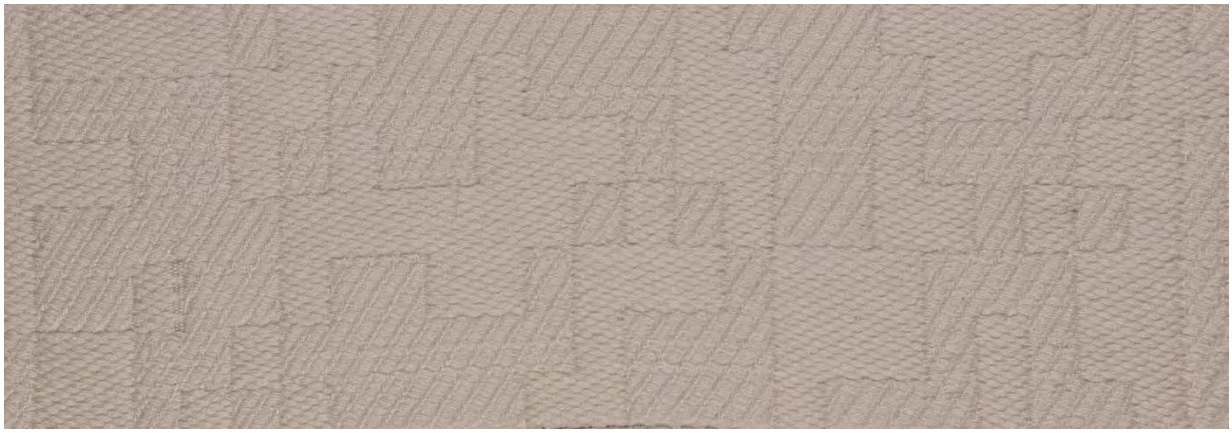


Figure 7. 96. Participant H co-designed textile sample three.

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE THREE TEXT (Read with emotional connection):

I have to say this is one of the most disappointing emails we have ever received. Your tone, manner and accusations are quite frankly disgusting. After DJ (Khruangbin) was rushed to hospital hours before

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE FOUR:

Figure 7. 97. Participant H co-designed textile sample four.

PARTICIPANT H CO-DESIGNED TEXTILE SAMPLE FOUR TEXT (Read without emotional connection):

Monday motivation. Every Monday for the rest of February, you can get 25% off food when you dine in. if this isn't enough Monday motivation, then we don't know wha tis! Start your week on a high and use code

7.11. APPENDIX J: FINAL CO-DESIGNED TEXTILES

Figure 7. 98. Participant A final co-designed textile.

Figure 7. 101. Participant A final co-designed textile.

Figure 7. 102. Participant B final co-designed textile.

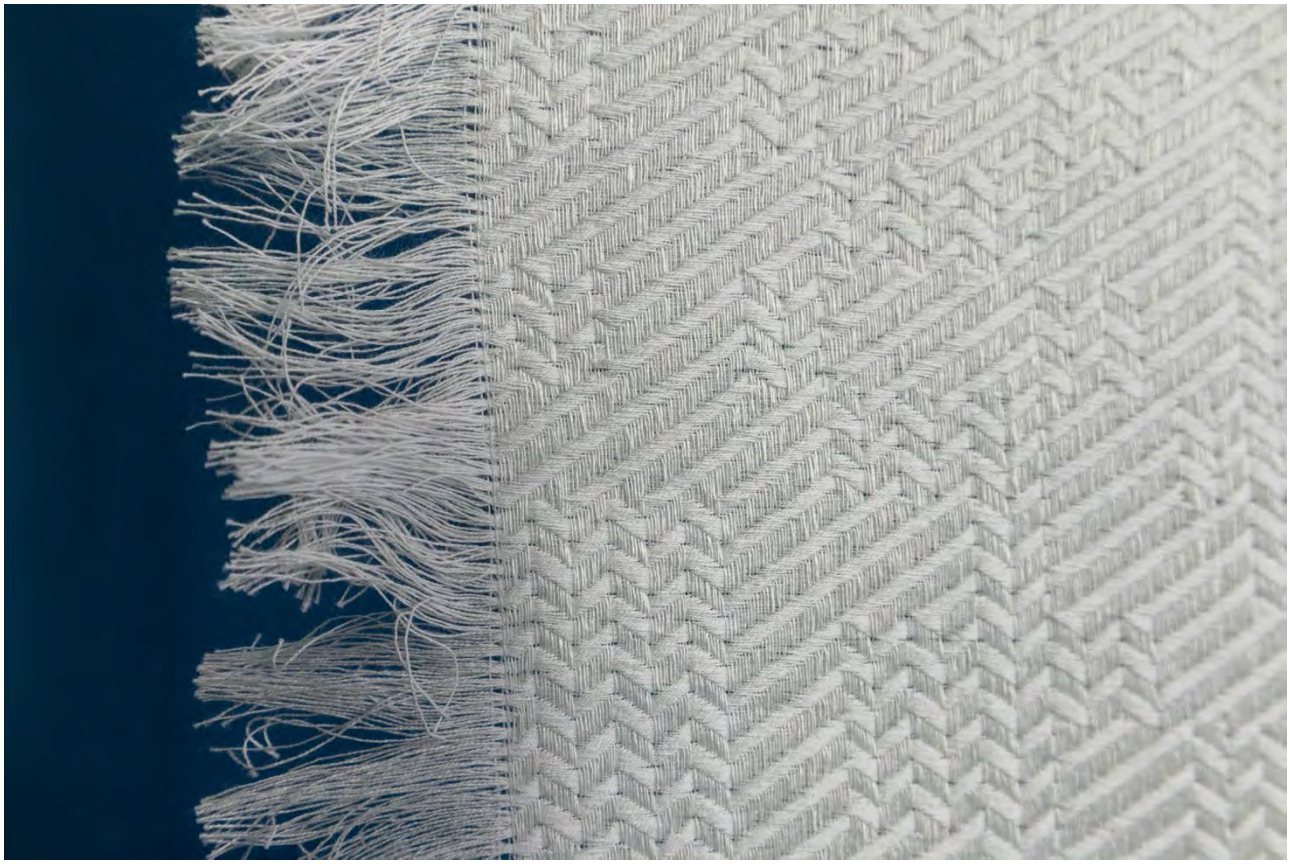


Figure 7. 103. Participant B final co-designed textile.

Figure 7. 104. Participant C final co-designed textile.

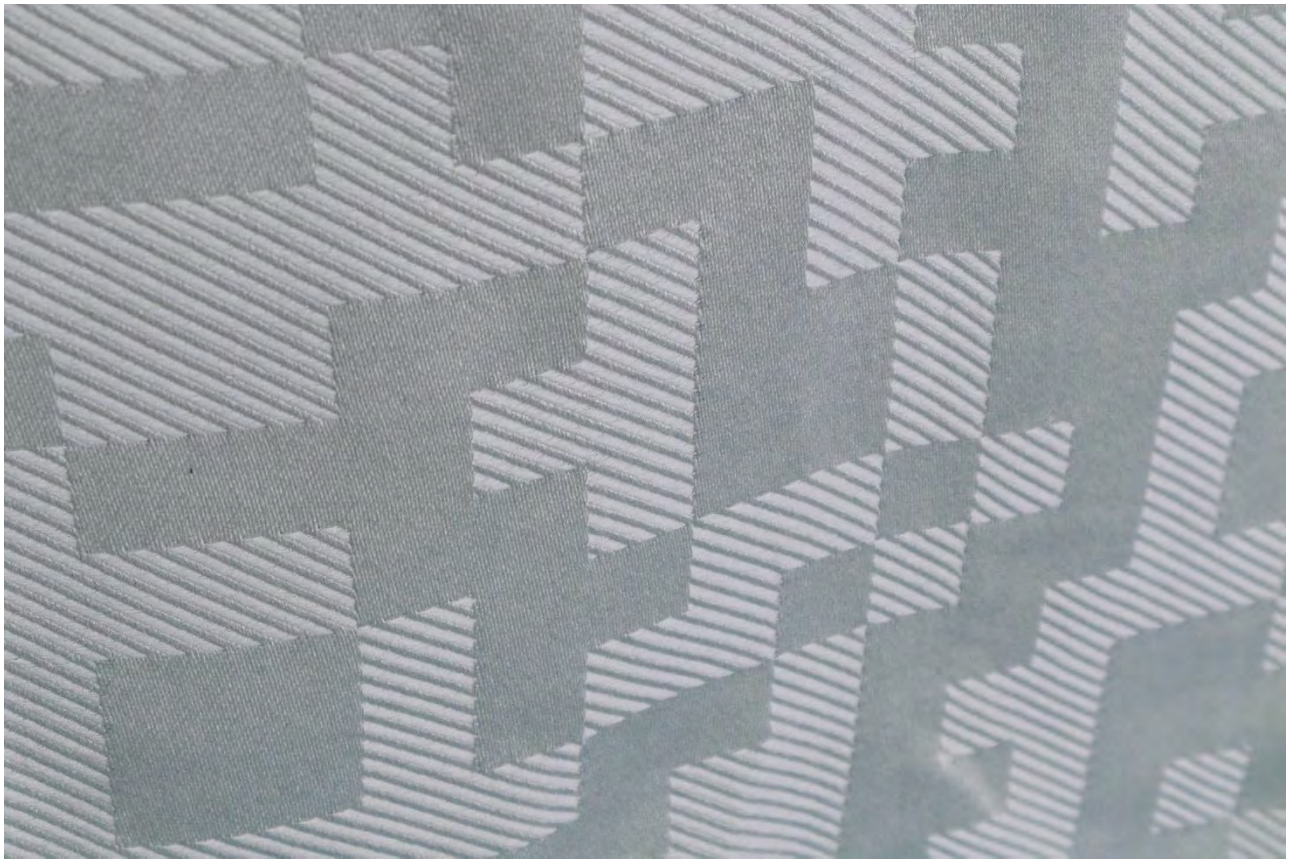


Figure 7. 105. Participant C final co-designed textile details.

Figure 7. 106. Participant D final co-designed textile.

Figure 7. 107. Participant D final co-designed textile details.

Figure 7. 108. Participant E final co-designed textile.

Figure 7. 109. Participant E final co-designed textile details.

Figure 7. 110. Participant F final co-designed textile.

Figure 7. 111. Participant F final co-designed textile details.

Figure 7. 112. Participant G final co-designed textile.

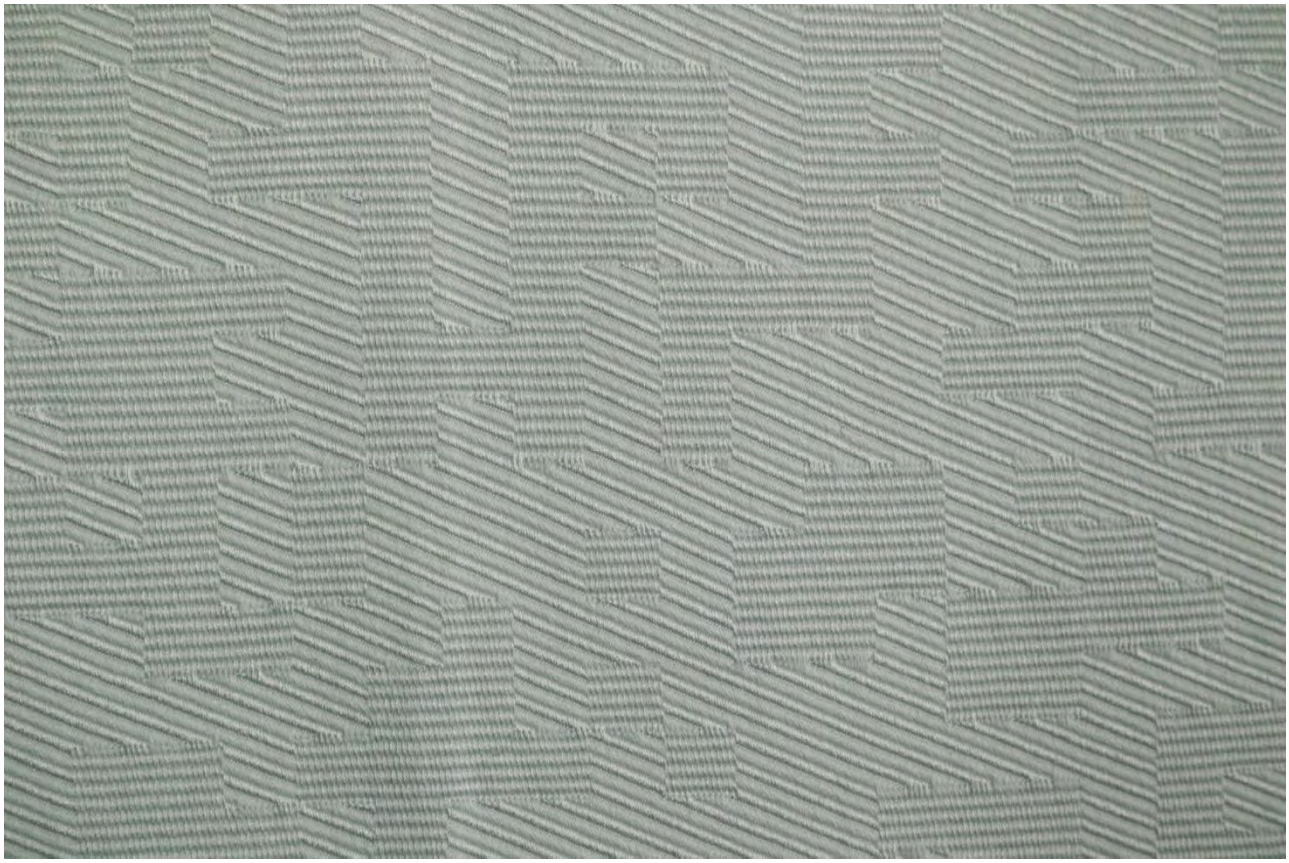


Figure 7. 113. Participant G final co-designed textile details.

Figure 7. 114. Participant H final co-designed textile.

Figure 7. 115. Participant H final co-designed textile details.

7.12. APPENDIX K: REFLECTIVE PRACTICE

This appendix presents images of some pages of the notebooks used during the weaving practice to reflect in and on each step of the process.

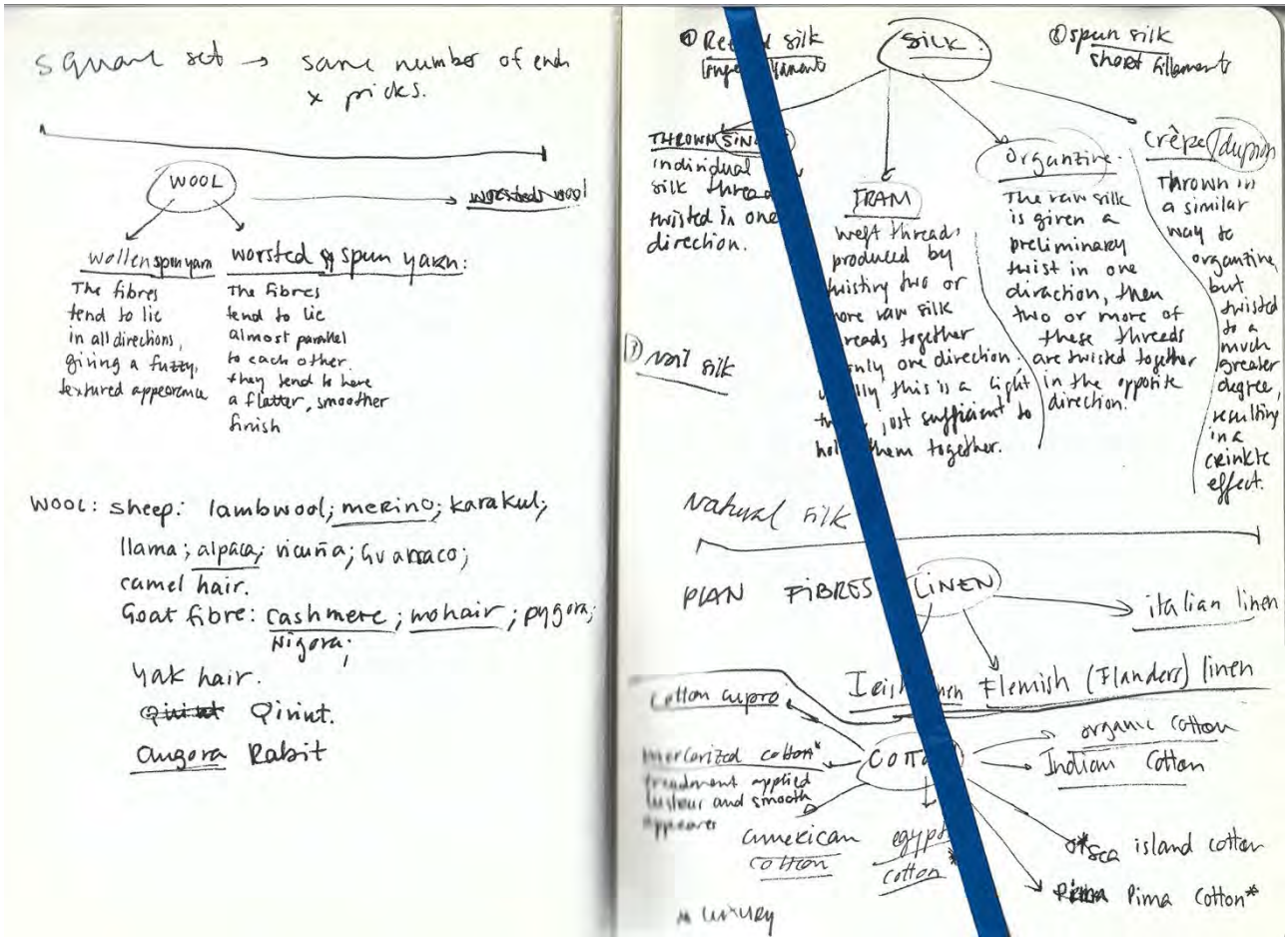


Figure 7. 116. Deciding which natural yarn should be used in this research (full practice).

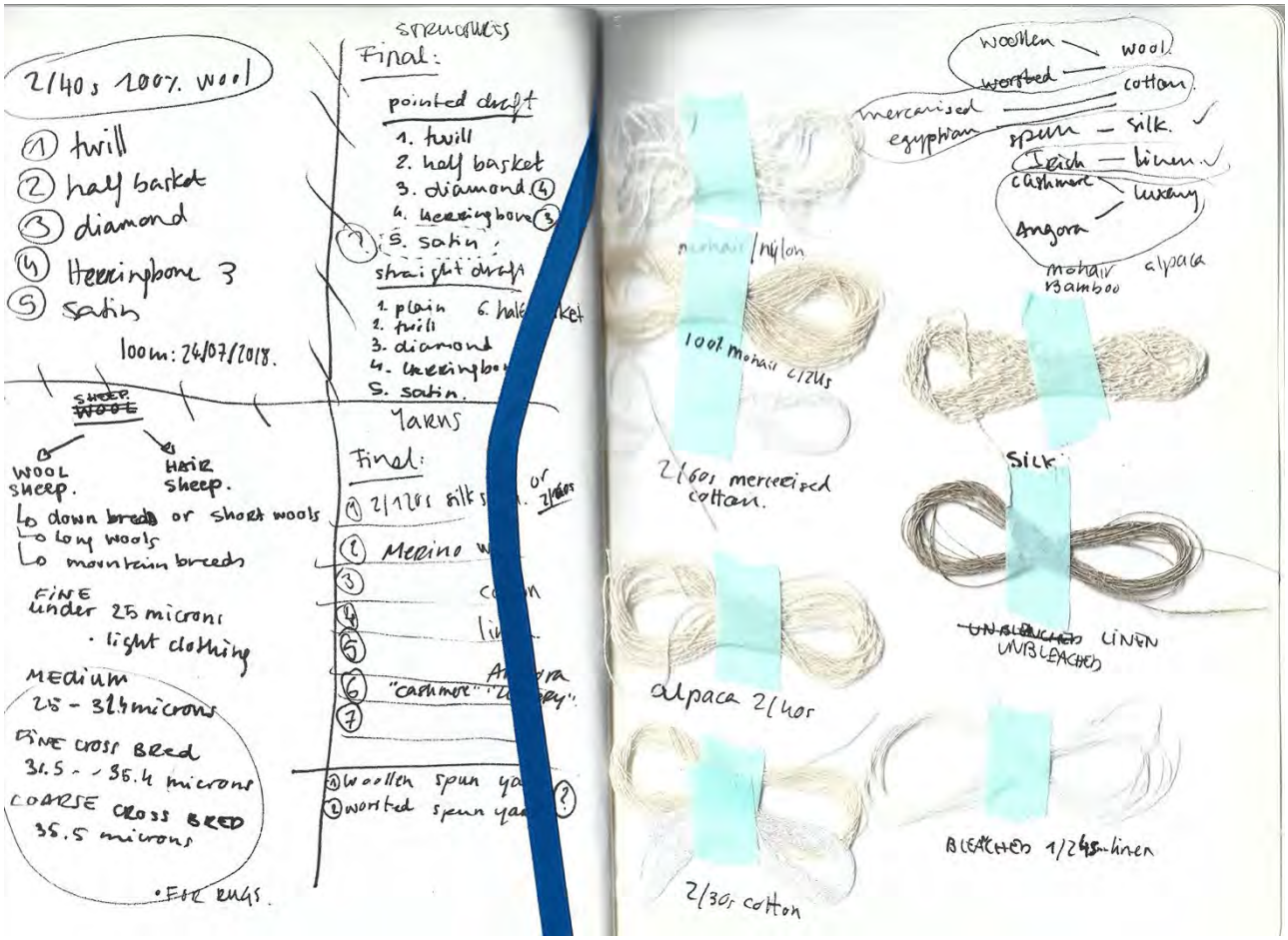


Figure 7. 117. Testing yarns sample to weave the 48 textile samples (stage one).

Figure 7. 118. 16-shaft dobby loom, tools, yarns, and weaving images (stage one).

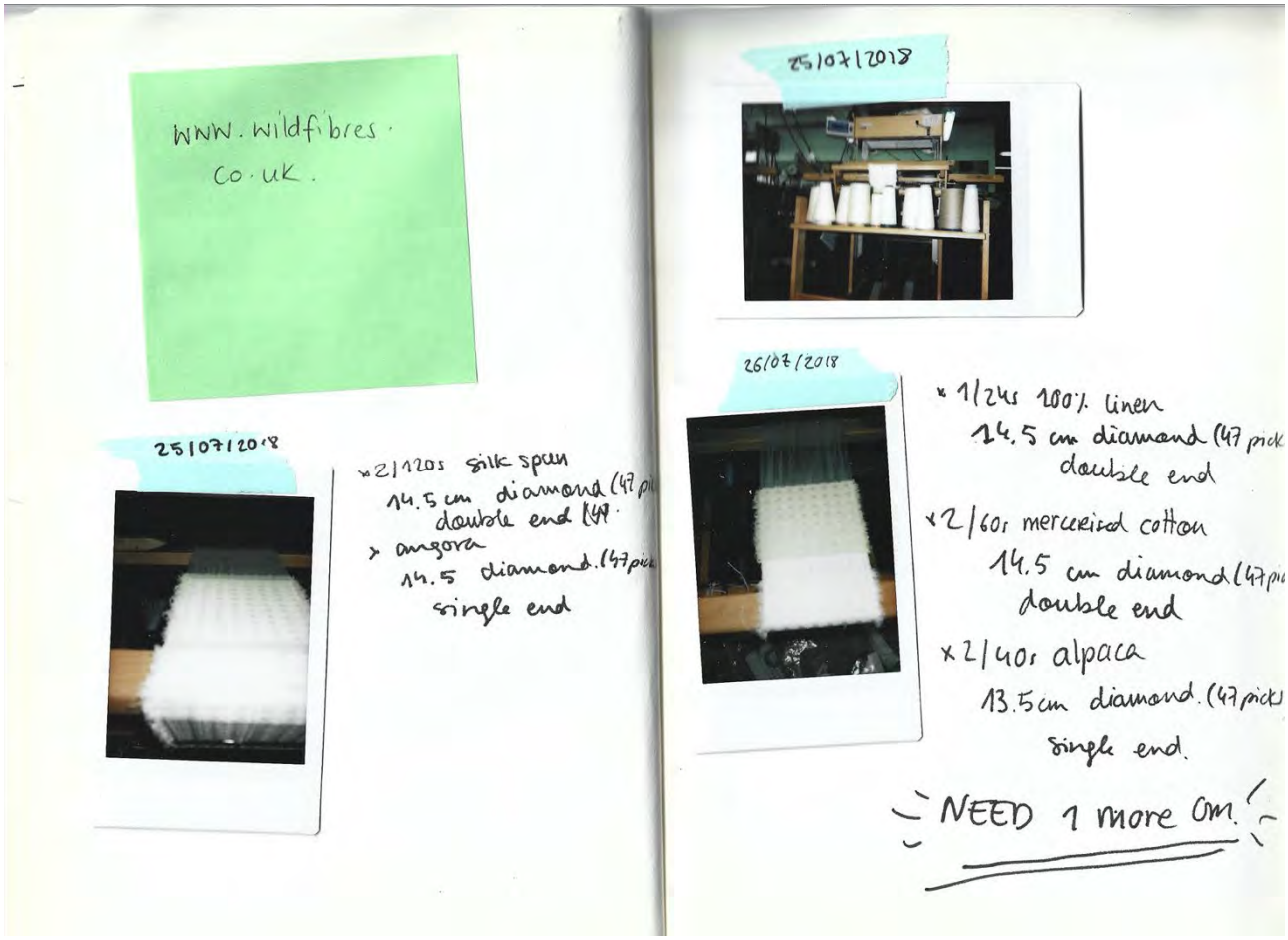


Figure 7. 119. Images and notes while weaving the 48 textile samples (stage one).

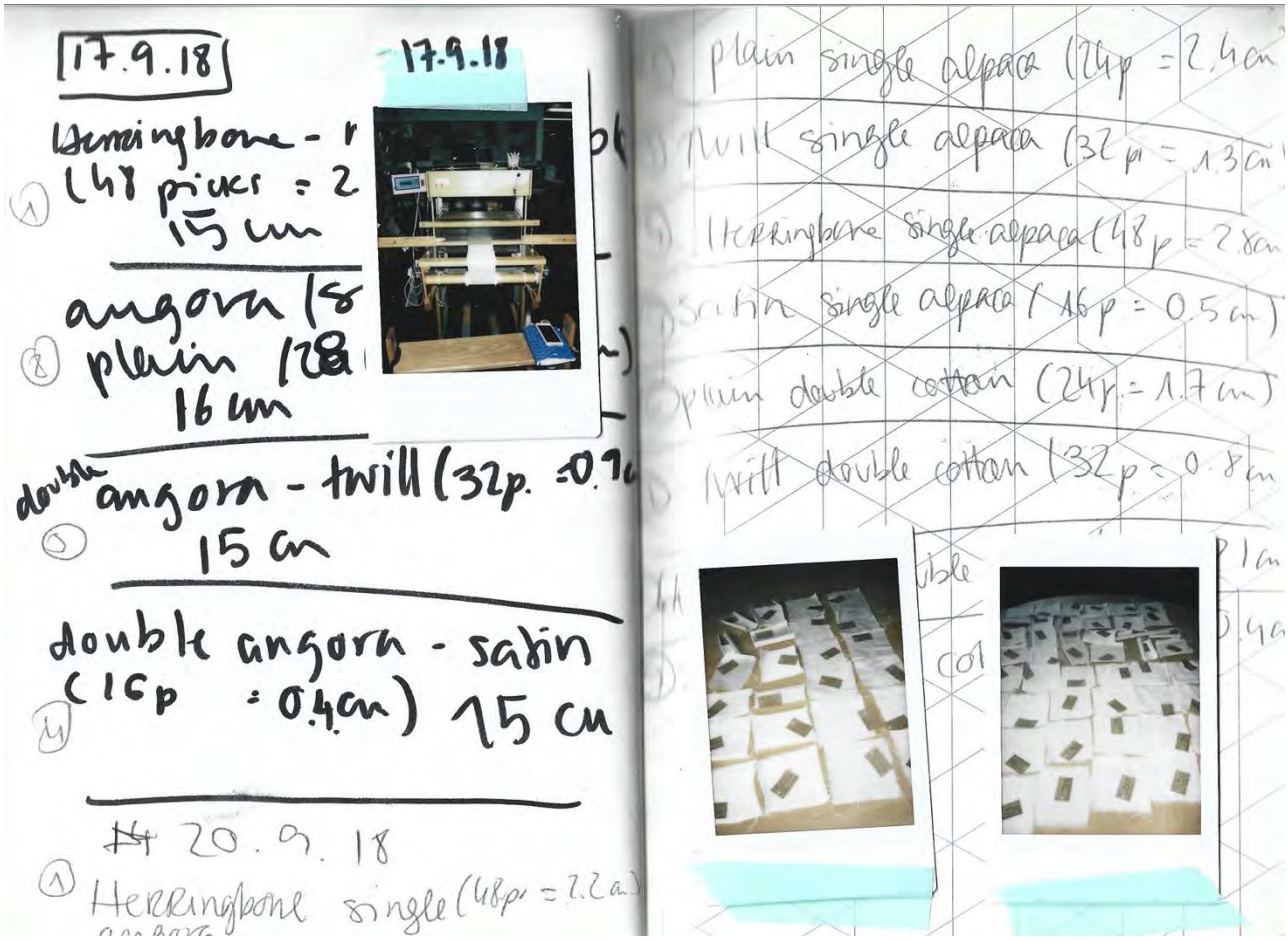


Figure 7. 120. Images and notes while weaving the 48 textile samples (stage one).

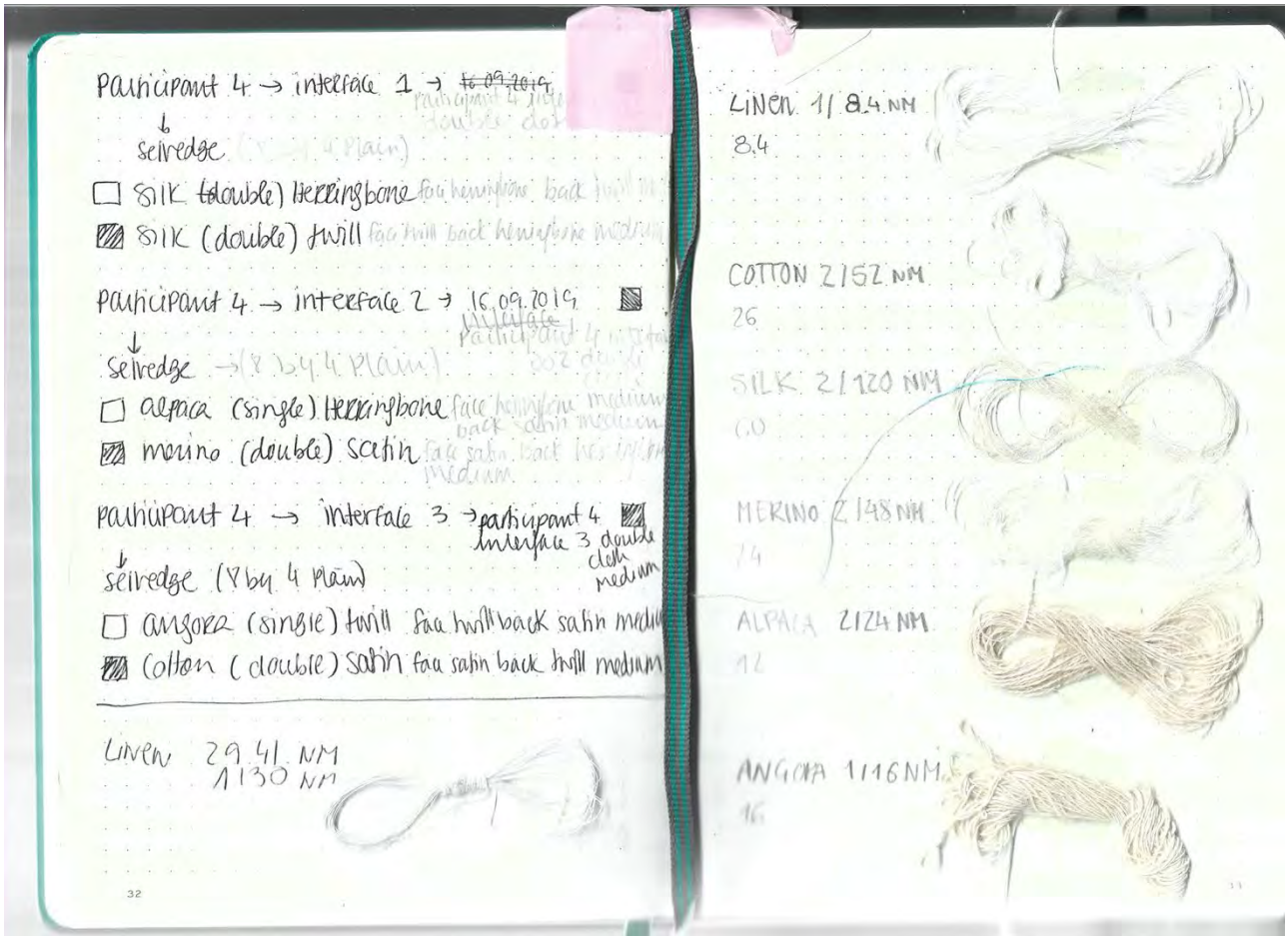


Figure 7. 121. Textile sample for co-designed textile samples (stage three).

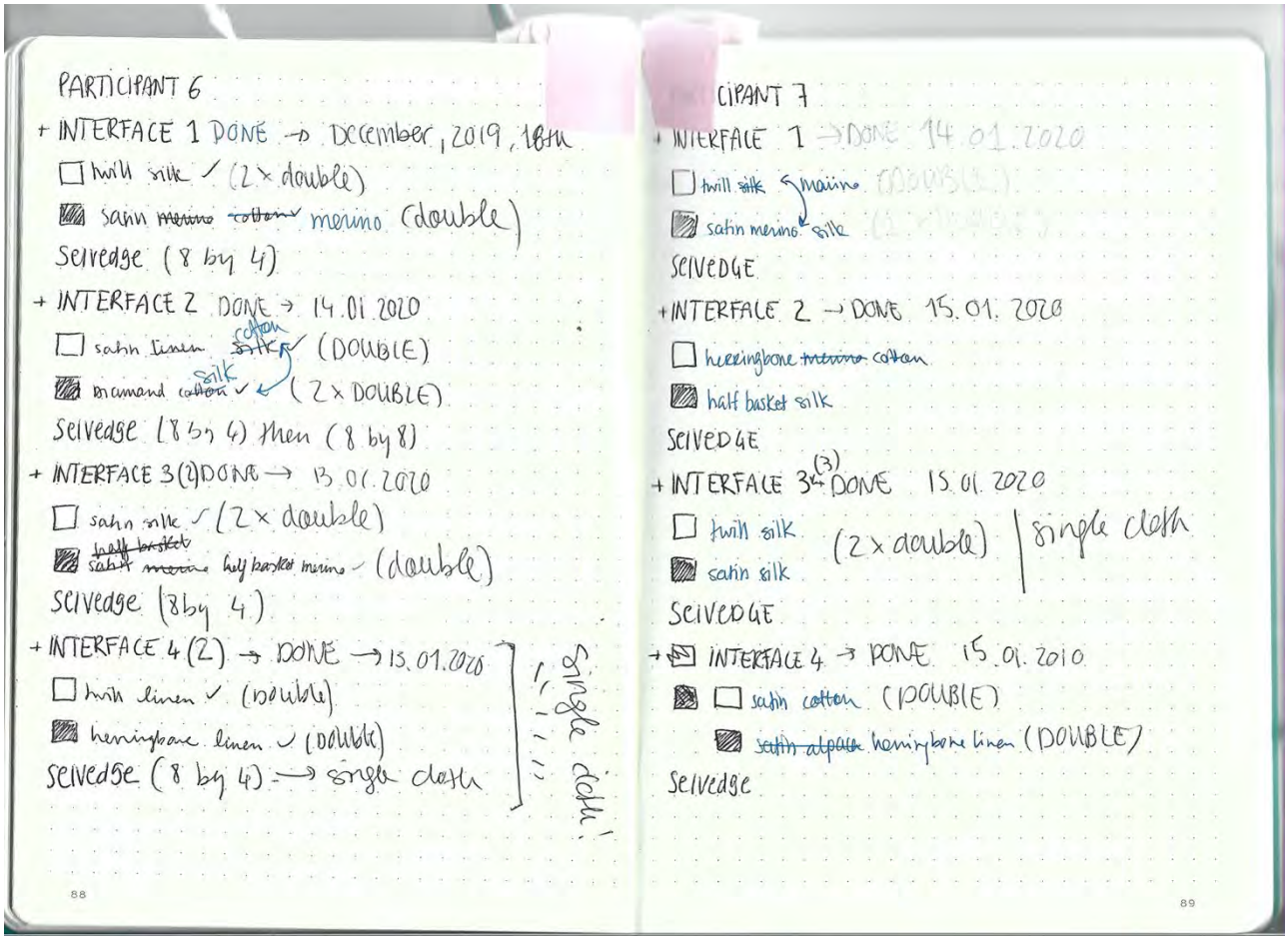


Figure 7. 122. notes taken when weaving the co-designed textile samples (stage three).

7.13. APPENDIX L: COMPUTER-BASED INTERFACES

The following link shows the four computer-based interfaces:

https://sean12697.github.io/Woven-Memories-V3/