## Contents

1 **Introduction** ......................................................... 1  
   1.1 Aim and Scope of This Book ............................... 1  
   1.2 Outline of This Book ................................................. 2  
      1.2.1 Cognitive Approaches to Concept Generation 2  
      1.2.2 New Research Methods for Concept Generation 3  
      1.2.3 Practice of Concept Generation .................. 4  
      1.2.4 Discussion .................................................. 4  
      1.2.5 Towards the Future ........................................... 4  
      1.2.6 Organization of This Book ....................... 6  
      1.2.7 Authors’ Previous Publications Related to This Book 6  
   References .............................................................. 6

2 **Perspectives on Concept Generation and Design Creativity** ....... 9  
   2.1 Very Early Stage of Design ........................................... 9  
   2.2 Interdisciplinary View of Research on Concept Generation 10  
   2.3 Creativity in Design ................................................ 11  
   2.4 Phases of Concept Generation ................................. 13  
      2.4.1 Concept ......................................................... 13  
      2.4.2 Problem–Driven Phase ................................... 13  
      2.4.3 Inner Sense–Driven Phase .............................. 14  
   2.5 Definitions of Concept Generation and Design Creativity 15  
   References .............................................................. 17

3 **Design Competence for Design Creativity** .......................... 21  
   3.1 Design Competence .................................................. 21  
   3.2 Types of Design Competence ...................................... 21  
      3.2.1 Competence to Inspire the Motivation from Inside a Thought Space 22  
      3.2.2 Competence to Abstract the Concepts ............... 22  
   References .............................................................. 22
7 Thinking Pattern in Concept Synthesis (2): Complexity of the Thinking Process

7.1 Constructive Simulation Versus Imitative Simulation

7.2 Method for Constructive Simulation of Concept Synthesis

7.2.1 Target Concept Synthesis Process

7.2.2 Method of Constructing the Virtual Concept Synthesis Process

7.2.3 Method of Confirming the Relevance of the Virtual Concept Synthesis Process

7.2.4 Method of Synthetic Verification of the Virtual Concept Synthesis Process

7.3 Execution of Constructive Simulation for the Concept Synthesis

7.3.1 Design Ideas Used for the Simulation

7.3.2 Construction of the Virtual Concept Synthesis Process

7.3.3 Confirmation of the Relevance of the Virtual Concept Synthesis Process

7.3.4 Synthetic Verification of the Virtual Concept Synthesis Process

7.3.5 Inference of the Characteristics of the Actual Concept Synthesis Process or Patterns from the Virtual Concept Synthesis Process

7.4 Towards the Dynamic Simulation

References

8 Constraints in Concept Synthesis: Distance Between and Association of Base Concepts

8.1 Distance Between the Base Concepts

8.1.1 Method of the Experiment

8.1.2 Results

8.2 Association of the Base Concepts

8.2.1 Method of the Experiment

8.2.2 Results

References

9 Synthesis of Abstract Shape: Practice of Concept Generation (1)

9.1 Blending of Abstract Shapes

9.2 Method of Blending the Abstract Form Features

9.2.1 Evaluation Function Acquiring Process

9.2.2 Evaluation Function Blending Process

9.2.3 Blended Shape Creating Process

9.2.4 Abstract Shape Representation
10 Synthesis of Motions: Practice of Concept Generation (2) .......................... 123
10.1 Creative and Emotional Motion ......................................................... 123
10.2 Method of Generating Creative and Emotional Motion ....................... 124
  10.2.1 A Mimic of Natural Objects ................................................... 125
  10.2.2 Blending of Motions ............................................................. 125
  10.2.3 Emphasis on Rhythmic Features ............................................. 125
  10.2.4 Rhythmic Feature–Based Motion Blending .................................. 126
10.3 Procedure to Generate Creative and Emotional Motion ...................... 127
10.4 Experiment ....................................................................................... 128
  10.4.1 Generation of Creative and Emotional Motion Using RFM Blending ... 128
  10.4.2 Evaluation of Generated Motions ............................................. 128
References ............................................................................................. 132

11 Synthesis of Functions: Practice of Concept Generation (3) .................... 133
11.1 Design of Function ................................................................. 133
11.2 Function Synthesis ....................................................................... 135
  11.2.1 Definition of the Function Synthesis in the FDP ....................... 136
  11.2.2 Classification of the Function Synthesis in the FDP .................... 136
  11.2.3 Definition of the Word Abstraction–Concretion Operation .......... 138
  11.2.4 Definition of the Word Match ................................................. 138
  11.2.5 Formulation of the Function Synthesis in the FDP ...................... 139
11.3 Thesaurus ....................................................................................... 144
11.4 System for Function Synthesis in the FDP ..................................... 147
11.5 A Trial to Generate a New Function Structure .................................. 148
References ............................................................................................. 148

12 Summary and Discussion ..................................................................... 151
12.1 Summary ...................................................................................... 151
  12.1.1 Consideration of Concept Generation ..................................... 151
  12.1.2 Findings and Inferences from the Experiments and Simulation ...... 153
  12.1.3 New Research Methods for Concept Generation ....................... 155
  12.1.4 Practice of Concept Generation ............................................. 156
12.2 Discussion ...................................................................................... 156
  12.2.1 What are the Inner Criteria? .................................................... 156
  12.2.2 What is an Ideal in Concept Generation? ................................. 157
  12.2.3 How Should the Very Early Stage of Design be Investigated? ...... 158
12.3 Towards the Future

12.3.1 Beyond the Scope of this Book

12.3.2 Towards the Next Generation of Design

12.3.3 Approach to Understanding Human Beings

References

About the Authors

Index
Concept Generation for Design Creativity
A Systematized Theory and Methodology
Taura, T.; Nagai, Y.
2013, XII, 172 p., Hardcover
ISBN: 978-1-4471-4080-1