Creativity in Research

Creativity is at the heart of successful research, yet researchers are rarely taught how to manage their creative process and modern academic life is not structured to optimize creativity. Creativity in Research provides concrete guidance on developing creativity for anyone doing or mentoring research. Based on a curriculum developed at Stanford University’s Hasso Plattner Institute of Design, this book presents key abilities that underlie creative research practice through a combination of scientific literature on creative confidence, experiential exercises, and guided reflection. By focusing attention on how research happens as well as its outputs, researchers increase their ability to address research challenges and produce the outputs they care about. Simultaneously, they may also transform their emotional relationship with their work, replacing stress and a harsh inner critic with a more open and emotionally empowered attitude.

Nicola Ulibarri is an assistant professor in Urban Planning and Public Policy at University of California, Irvine, USA. Her research investigates the environmental, social, and regulatory dimensions of infrastructure planning and management.

Amanda E. Cravens is a research social scientist for a US federal agency. She cofounded the Research as Design project to adapt design thinking training for researchers with Nicola, Anja, and Adam when she realized how much her past experience as a web designer was influencing her scholarship.

Anja Svetina Nabergoj is a lecturer at the Hasso Plattner Institute of Design at Stanford University, USA, where she teaches graduate classes and Executive Education programs. She also works with Fortune 500 companies on building their capacity for innovation.
SEBASTIAN KERNBACH is a lecturer, project manager, and researcher at the University of St Gallen, Switzerland and a visiting fellow at Stanford University, USA. He is the founder of the Visual Collaboration Lab (vicola.org) and the Life Design Lab (lifedesignlab.ch) in Switzerland.

ADAM ROYALTY is Lead Design Research Investigator at the Hasso Plattner Institute of Design at Stanford University, USA. He also founded the Columbia Entrepreneurship Design Studio, which amplifies peoples' problem-solving capacity through design.
Creativity in Research

Cultivate Clarity, Be Innovative, and Make Progress in Your Research Journey

NICOLA ULIBARRI AND AMANDA E. CRAVENS WITH ANJA SVETINA NABERGOJ, SEBASTIAN KERNBACH, ADAM ROYALTY
## Contents

<table>
<thead>
<tr>
<th>List of Figures</th>
<th>page vii</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables</td>
<td>viii</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>ix</td>
</tr>
</tbody>
</table>

1 The Creativity at the Heart of Your Research 1

### SECTION I  DEVELOP YOUR CREATIVE ABILITIES 21

2 Mind Your Process and Be Intentional 29

3 Use Emotions to Diagnose Problems and Move Forward 44

4 Solve the Right Problem 73

5 Iterate and Experiment 94

### SECTION II  CULTIVATE CONDITIONS THAT SUPPORT CREATIVITY 125

6 Choose Your Language and Stories 127

7 Manage Your Energy 142

8 Make Your Research a Team Sport 158
vi CONTENTS

SECTION III  BRING THE ABILITIES INTO YOUR OFFICE OR LAB  181
9 Integrate the Creative Abilities, Part I  183
10 Integrate the Creative Abilities, Part II  204
11 Thirty-Day Creativity in Research Program for Individuals or Groups  226
12 Mentoring Creativity  241
13 Conclusion  255

Appendix  Comparing Creative Practice Frameworks  264
Notes  273
List of Exercises  312
Index  314
Figures

1.1 The creative abilities  
2.1 Formats for visualizing concepts  
2.2 Conventions to visualize pieces of information  
2.3 Intention, attention, attitude  
3.1 Applying emotional intelligence to research process and content, for yourself and others  
3.2 Four steps for using emotional intelligence  
4.1 Increase the problem space to increase the solution space  
4.2 View a problem from multiple perspectives  
4.3 An example of why/how laddering using Richard and Maria’s story  
5.1 Learning through incremental effort  
5.2 Divergent versus convergent thinking  
5.3 Examples of prototypes in research  
6.1 Common emotional arcs in stories  
7.1 Allocating work to your energy curve  
8.1 Matching feedback demand to feedback supply  
8.2 Varieties of feedback settings  
9.1 The creative abilities  
9.2 Using the abilities as a cycle  
10.1 Using the abilities as lenses to view your research challenge  
11.1 An overview of the thirty-day progression  
13.1 The creative abilities

page 8  
27  
27  
33  
51  
60  
77  
87  
93  
96  
98  
114  
134  
150  
170  
175  
182  
203  
225  
230  
259
### Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Four steps for using emotional intelligence</td>
<td>61</td>
</tr>
<tr>
<td>3.2</td>
<td>How emotions might manifest in research</td>
<td>64</td>
</tr>
<tr>
<td>5.1</td>
<td>Examples of prototypes in research</td>
<td>112</td>
</tr>
<tr>
<td>5.2</td>
<td>You've finished a prototype ... now what?</td>
<td>118</td>
</tr>
<tr>
<td>7.1</td>
<td>Activities to create calm energy</td>
<td>146</td>
</tr>
<tr>
<td>A.1</td>
<td>Comparing creativity frameworks</td>
<td>271</td>
</tr>
</tbody>
</table>
Acknowledgments

This book is the result of a decade of learning, experimentation, and iteration. Along the way we have benefited from bountiful and generous feedback, support, and assistance, which we welcome the chance to acknowledge publicly.

The Hasso Plattner Institute of Design at Stanford University (“the d.school”) nurtured and incubated our project, our curriculum, and the author team in our development as creativity educators. Each of us originally came to the d.school as a student of creativity and design, we are thankful for the guidance of our own teachers and mentors. We would like to share one story that illustrates this support. In September 2010, when we had just begun to think about the relationship between creativity and science, Amanda was taking a design immersion course and becoming increasingly convinced that there needed to be a course that tailored design thinking training for use specifically by researchers. As graduate students tend to do, Amanda assumed the best way to make this exciting new idea a reality was to convince one of her professors to sponsor it. Bernie Roth looked her in the eye and said, “That’s a great idea. I think you should do something about it.” Thank you, Bernie, for just the right challenge at the right moment. And thank you to the d.school for creating an educational environment that encourages students to take ownership of their own ideas. We are grateful to the many d.school staff and instructors who have provided input into our curriculum over the years, particularly Banny Banerjee, Thomas Booth, Charlotte Burgess-Auburn, Bill Burnett, Carissa Carter, Scott Doorley, Dave Evans, Kathryn Segovia, Sarah Stein Greenberg, Jeremy Utley, Terry Winograd, and Scott Witthoft.

Colleagues in other Stanford departments and offices have also provided invaluable intellectual, material, and logistical assistance,
x Acknowledgments

including the Emmett Interdisciplinary Program in Environment and Resources (Jen Mason, Deb Wojcik); Graduate School of Education (Nicole Ardoin); Vice Provost for Graduate Education (Helen Doyle, Chris Golde, Anika Green); School of Earth, Energy, and Environmental Sciences (Pamela Matson); and Woods Institute for the Environment (Meg Caldwell, Margaret Krebs).

At University of California, Irvine, Nicola would like to thank Scott Bollens, Martha Feldman, Nick Marantz, and Virginia Parks for guidance and support along the way. At University of Ljubljana, Anja would like to thank Marko Pahor and Mateja Drnovšek, heads of the Doctoral Program, for allowing her to prototype and test new content and learning experiences for doctoral students. Anja would also like to thank her mentor and friend at the d.school, Perry Klebahn, for helping her focus on things she cares deeply about. At University of St. Gallen, Sebastian would like to thank Martin J. Eppler for his feedback, insights, and guidance. Ashley Hooper provided research assistance, ably handling scientific literature on a wide array of topics. Malte Belau created the graphics that appear in the text, helping us coherently and playfully express our ideas.

Our curriculum development and the insights about creativity we had along the way simply would not have been possible without our incredible students. Through many iterations, they have experimented willingly with new ways of doing and thinking, shared bravely their triumphs and struggles, and collaborated enthusiastically across academic disciplines and types of challenges. They also participated willingly in our design-based research evaluations and gave candid feedback on exercises. Some have returned to our classes and workshops as coaches, providing an essential bridge between the student and teacher perspectives. We are particularly grateful to the students and colleagues who gave us permission to use their stories in the book. While we do not mention them by name here in order to preserve their anonymity, we reiterate our gratitude once again. We would also like to acknowledge Lindley Mease and Marilyn...
ACKNOWLEDGMENTS  xi

Cornelius’s significant contributions to the Research as Design project and curriculum.

We drew extensively on our own feedback network to write this book. Scott Bollens, Tom Hayden, Lauren Oakes, and Dan Stokols provided important feedback on our proposal and guidance on the process of finding a publisher. Profound thanks go to Kendra Brown, Scott Doorley, Mateja Drnovšek, Martin Eppler, Greg Marsden, Pamela Matson, Jamie McEvoy, Rebecca Nelson, Anne Siders, Julia von Thienen, Susie Wise, and Scott Witthoft for reviews of various versions of this manuscript. And thank you to our editor, David Repetto, and everyone at Cambridge University Press for supporting this project and shaping our final book.

Since the beginning, this project has been sustained by the collective passion of its authors. As a result, time and energy devoted to it have often had to be borrowed from precious family time. Thank you to Ryan McCarty; Andrej, Jun, and Zai Nabergoj; Kimberley Köttering; Cathy Chase, Romy, and Juno Chase Royalty; and of course Mighty Dog for their patience, continued support, and daily inspiration.

Finally, each of us would like to recognize our coauthors. We are grateful for our sustained partnership and the chance to work together to put these ideas out into the world.