Living in a changing world

How the early-life environment influences animal and human ability to cope with change

Proefschrift

ter verkrijging van de graad van doctor aan de Rijksuniversiteit Groningen
op gezag van de rector magnificus prof. dr. E. Sterken
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op

Vrijdag 13 February 2015 om 11.00 uur

doors

Monica Barbara Wilhelmina Langenhof

teboren op 17 September 1984
te Denekamp
Promotores
Prof. dr. ir. J. Komdeur
Prof. dr. A.J. Oldehinkel

Beoordelingscommissie
Prof. dr. M.A.G. van Aken
Prof. dr. A.M. Bell
Prof. dr. J.M. Koolhaas
The research presented in this thesis was carried out at the Behavioural Ecology and Self-Organization (BESO) group of the Groningen Institute for Evolutionary Life Sciences (GELIFES) of the University of Groningen (The Netherlands), in cooperation with the Interdisciplinary Center Psychopathology and Emotion Regulation (ICPE) at the University Medical Center Groningen. Research was conducted according to the requirements of the Graduate School of Science (Faculty of Mathematics and Natural Sciences, University of Groningen). The research was supported by a Ubbo Emmius grant from the University of Groningen to M. Rohaa Langenhof. Additional financial support was received from Schure-Beijerinck-Popping Fund of the Royals Netherlands Academy of Arts and Sciences.

The printing of this thesis was partially funded by the University of Groningen and the Faculty of Mathematics and Natural Sciences.

Cover design: Melanie Smits @ MelSmits.net
Lay-out & illustrations: Melanie Smits @ MelSmits.net
Photos: M. Rohaa Langenhof
Printed by: Gildeprint, Enschede
Dedication

To the upcoming generations, who get to live in a world beautifully different from anything those before ever experienced. Live. Love. Follow your dreams.

Don’t let the attitudes that made sense to those who came before you, dictate the future you create for yourselves and your planet. Be different. Be better! Have fun.

There is a river flowing now very fast.
   It is so great and swift,
   that there are those who will be afraid,
   who will try to hold on to the shore,
   they are being torn apart and will suffer greatly.

   Know that the river has its destination.
   The elders say we must let go of the shore,
   push off into the middle of the river,
   and keep our heads above water.

   And I say,
   see who is in there with you
   and celebrate.

Hopi Elder, Arizona, June 8 2000
Table of Contents

Dedication 4
Chapter 1: General introduction: Change, coping and the early-life 7
Box 1.1: Change Blindness 14
Box 1.2: Canalisation and paradigm shift 15
Chapter 2: Coping with change: a closer look at the underlying attributes of change and the individual response to unstable environments 27
Chapter 3: Small variations in early-life environment can affect coping behaviour in response to foraging challenge in the three-spined stickleback 51
Chapter 4: The effects of experimental design on reliability and comparability of stickleback personality measures: An exploratory study 67
Chapter 5: Designing the experimental environment: how to choose rearing and testing environment for animal personality assays 79
Chapter 6: Why and how the early-life environment affects development of coping behaviours: a review 101
Chapter 7: Effects of parenting quality on adolescents’ personality resemblance to their parents. The TRAILS study 135
Chapter 8: Adolescents’ personality resemblance to parents is associated with well-being and depression. The TRAILS study 151
Chapter 9: General Discussion: Struggling and thriving in a changing world 165
Appendix 1: The TRAILS study 187
Nederlandse Samenvatting 193
English Summary 204
Acknowledgments / Dankwoord 215
References 219