

Emotions through the eyes of our closest living relatives: exploring attentional and behavioral mechanisms Berlo, E. van

Citation

Berlo, E. van. (2022, May 19). *Emotions through the eyes of our closest living relatives: exploring attentional and behavioral mechanisms*. Retrieved from https://hdl.handle.net/1887/3304204

Version: Publisher's Version

Licence agreement concerning inclusion of doctoral

License: thesis in the Institutional Repository of the University

of Leiden

Downloaded from: https://hdl.handle.net/1887/3304204

Note: To cite this publication please use the final published version (if applicable).

Emotions through the eyes of our closest living relatives: Exploring attentional and behavioral mechanisms

Evy van Berlo

ISBN: 978-90-9035984-7

Design/Lay-out: Ferdinand van Nispen tot Pannerden, *my*-thesis.nl

Cover design: Evy van Berlo

Print: Ovimex, Deventer NL

Emotions through the eyes of our closest living relatives: Exploring attentional and behavioral mechanisms

Proefschrift

ter verkrijging van de graad van Doctor aan de Universiteit Leiden, op gezag van Rector Magnificus Prof.dr.ir. H. Bijl, volgens besluit van het College voor Promoties te verdedigen op donderdag 19 mei 2022 klokke 11.15 uur

door

Evy van Berlo geboren op 26 maart 1990 te Maastricht **Promotor:** Prof.dr. Mariska E. Kret

Co-promotor: Dr. Yena Kim

Promotiecommissie: Prof.dr. Sander T. Nieuwenhuis (Wetenschappelijk

Directeur Instituut Psychologie / voorzitter)

Prof.dr. Karline R. L. Janmaat

Prof.dr. Elisabeth H. M. Sterck, Universiteit Utrecht Prof.dr. Frans B. M. de Waal, Emory University

Dr. Anne E. Urai Dr. Katharina Riebel

The research included in this dissertation was supported by grants from Stichting Elise Mathilde Fonds (Leiden University Fund, awarded to Mariska E. Kret and Evy van Berlo) and the Dr. J. L. Dobberke Stichting voor Vergelijkende Psychologie (Koninklijke Nederlandse Akademie van Wetenschappen, awarded to Evy van Berlo)

Acknowledgments

My Ph.D. journey would not have been made possible without the support of many dear friends and colleagues. Regardless of whether you find your name down below, I want to express my sincere gratitude for your support. I want to especially thank the following people:

Mariska Kret, thank you for being a great teacher, for giving me opportunities that I thought to be unreachable. I admire your perseverance, ambition, and your unyielding support of women in science. Thank you, Jorg Massen, for your kindness and support during my Master's and my Ph.D. Your critical and creative thinking has been an inspiration to me and helped me elevate my work to a higher level. Daan Laméris, thank you for your emotional and intellectual support, and your openminded attitude. Your help in testing the orangutans across multiple studies has been invaluable. I am very proud of our work together. Alejandra Díaz-Loyo and Oscar Juárez-Mora, I am grateful for your fantastic collaboration on the orangutan yawning project. Your help has been crucial to the success of the project and thanks to you and Jorg, the project was able to continue during my sick leave.

My paranymphs Tom Roth and Iliana Samara; your wittiness and humor always make my day. I thank both of you for your immense support, your kindness, creativity, and your pragmatism. I learned so much from you, and you really helped me improve my writing and analysis skills. Thank you, Friederike Behrens-Scholten, for your never-ending enthusiasm, your keen eye for detail, and your help during difficult times. You light up the room like no other! Joyce Snijdewint, thank you for being such a kind-hearted person and a great friend. Thank you for always listening and offering help where you can. Your perseverance is inspiring to me. Yena Kim and Julia Folz, I highly enjoyed our karaoke nights to wind down from work. Julia, I loved your daily tea quotes on the whiteboard pre-corona times, and Yena, your cooking skills are simply amazing. Your down-to-earth attitude and insightful comments have been very helpful in my work. Tonko Zijlstra, thank you for your humor and your warmhearted spirit that kept things fun and light during work in the pandemic. Linda Jaasma, your training of the bonobos has been crucial to the success of several of my studies. Thank you for building the foundation that was necessary to succeed.

I also sincerely thank the Apenheul caretakers; Jacqueline Ruijs, Rudy Berends, Keetie de Koeier, Iris Schapelhouman, Grietje Grootenhuis, Carolijn de Jong, Roan de Boer, Bianca Klein, Frank Rijsmus, Cora Schout, Tijs Swennenhuis, and Martine Verheij. Without your time, support, and patience, these studies would not have

been possible. Thank you, Thomas Bionda, for facilitating the great ape studies at Apenheul, and Wendy Cieremans as well as Apenheul's volunteers for facilitating the research with visitors. I am grateful for having had the chance to work in such an exciting and beautiful environment.

I thank my participants, ape and human alike, for taking part in my studies, and the many students who helped with collecting all the data. Thank you to the technical support staff: Maureen Meekel, Evert Dekker, Elío Sjak-Shie, and Iris Spruit, for building custom-made devices and scripts to help with data acquisition and analyses. I also thank the doctorate committee for investing their valuable time in reading and evaluating my work, and for providing helpful feedback.

Thank you to my dear friends, Leonie Groeneveld, Sander Geuke, and Samantha Lems, for your never-ending support. You have been there with me all the way, and are truly the best! Jeannot van Berlo, thank you for being my creative, free-spirited brother. Jos van Riet and Thea van Riet-Sprengers, my parents-in-law, thank you for your guidance when I needed it the most. My aunt Mieke Spaetjens-Beerens and uncle Gerard Spaetjens: thank you for reading my Dutch summary and helping me improve it. Thank you to my sweet parents, Corry van Berlo-Beerens and Ger van Berlo, for always believing in me. Thank you for having taught me to never stop asking questions, and to persevere in the face of hardships. Without you, I would not have been where I am now. Finally, I thank you, Martijn van Riet, my fantastic boyfriend. Thank you for your unconditional support, your guidance, love, and trust. You are my beacon and my anchor. I love you.

Evy van Berlo November 19th, 2021, The Hague

Table of Contents

Chapter 1 A general introduction to emotion perception and its			
underlying mechanisms			
Dissertation outline	21		
Part I: Attention	25		
Chapter 2 Attention towards emotions is modulated by familiarity	27		
with the expressor. A comparison between bonobos and humans			
Introduction	29		
Experiment 1: Bonobos' attentional bias towards emotions of	33		
familiar and unfamiliar conspecifics			
Experiment 2: Bonobos' attentional bias towards emotions of	42		
familiar and unfamiliar humans			
Experiment 3: Humans' attentional bias towards emotions of	47		
familiar and unfamiliar conspecifics			
General discussion	53		
Chapter 3 Attentional bias in humans towards human and bonobo	59		
expressions of emotion			
Introduction	61		
Method	64		
Discussion	76		
Conclusion	81		
Chapter 4 Attentional selectivity for emotions: humans and bonobos			
compared			
Introduction	87		
Experiment 1: Examining biased attention to emotions in bonobos	90		
Experiment 2: Examining biased attention to emotions in humans	99		
Discussion	103		
Part II: Spontaneous Mimicry	109		
Chapter 5 Low relationship quality predicts self-scratch contagion	111		
during tense situations in orangutans			
Introduction	113		
Method	115		
Discussion	122		

Chapter 6 Experimental evidence for yawn contagion in orangutans		
Introduction	129	
Method	133	
Discussion	140	
Part III: Implicit Associations	147	
Chapter 7 Validation of a pictorial version of the Implicit Association	149	
Test (IAT) for comparative research		
Introduction	151	
Experiment 1: PIAT in the zoo	153	
Experiment 2: Online PIAT and WIAT	162	
Discussion	170	
Chapter 8 General discussion	175	
Summary of key findings	177	
Theoretical implications	180	
Methodological considerations and future directions	184	
Conclusion	187	
Appendices		
Appendix A	193	
Appendix B	201	
Appendix C	206	
Appendix D	209	
Appendix E	214	
References	225	
Samenvatting	251	
Curriculum Vitae	259	
List of publications	265	