

Fachbereich Erziehungswissenschaft und Psychologie
der Freien Universität Berlin

Goal-Directed Interpersonal Action Synchronization
Across the Lifespan:
A Dyadic Drumming Study

Dissertation

zur Erlangung des akademischen Grades
Doktorin der Philosophie
(Dr. phil.)

Vorgelegt von
Dipl.-Psych.
Anna Kleinspehn

Erstgutachter: Prof. Dr. Ulman Lindenberger,
Max-Planck-Institut für Bildungsforschung, Berlin

Zweitgutachter: Prof. Dr. Herbert Scheithauer,
Freie Universität Berlin

Betreuer:
Prof. Dr. Ulman Lindenberger, Max-Planck-Institut für Bildungsforschung, Berlin
Dr. Michaela Riediger, Max-Planck-Institut für Bildungsforschung, Berlin
Prof. Dr. Florian Schmiedek, Humboldt-Universität zu Berlin

Berlin, 11. Juni 2008

TABLE OF CONTENTS

DANKSAGUNG (ACKNOWLEDGEMENTS)	IX
ABSTRACT	X
ZUSAMMENFASSUNG	XII
INTRODUCTION	1
1. THEORETICAL BACKGROUND	4
1.1 Interpersonal Action Synchronization.....	4
1.2 Developmental Aspects of Interpersonal Action Synchronization.....	7
1.2.1 Non-Intentional Interpersonal Synchronization.....	7
1.2.2 Goal-Directed Interpersonal Action Synchronization.....	10
1.3 Interpersonal Action Synchronization in the Context of Life Mechanics and Life Pragmatics: A Lifespan-Theoretical Framework.....	13
1.3.1 Key Concepts of Lifespan Psychology.....	14
1.3.2 Applying Lifespan Concepts to the Development of Interpersonal Action Synchronization: A Theoretical Model.....	16
1.3.3 Interpersonal Action Synchronization in the Context of Life Mechanics.....	17
1.3.4 Interpersonal Action Synchronization in the Context of Life Pragmatics.....	19
<i>Interpersonal Flexibility</i>	24
<i>Stereotypic (Age-Related) Expectations</i>	25
1.3.5 Consequences of Successful Interpersonal Action Synchronization for Individuals and Dyads.....	26
<i>Short-Term Effects of Interpersonal Action Synchronization</i>	27
<i>Long-Term Effects of Interpersonal Action Synchronization</i>	29
1.3.6 Summary of Theoretical Assumptions on Goal-Directed Interpersonal Action Synchronization.....	31

1.4 The Dyadic Drumming Paradigm.....	32
1.4.1 The History of Tapping Paradigms.....	32
1.4.2 From Individual Tapping to Dyadic Drumming.....	34
1.5 Research Questions and Hypotheses.....	36
1.5.1 Individual Antecedents and Consequences of Dyadic Action Synchronization: A Working Model.....	37
1.5.2 How Do Individual and Age-Related Differences in Sensorimotor Abilities and Social Competencies Relate to Dyadic Action Synchronization?.....	38
<i>Individual and Age-Related Differences in Sensorimotor Abilities.....</i>	39
<i>Individual and Age-Related Differences in Social Competencies.....</i>	41
<i>Excursus: Exploration of Age-Specific Stereotypes.....</i>	42
1.5.3 Do Dyads of Varying Age Compositions Differ in Dyadic Action Synchronization?.....	43
1.5.4 How Does the Accuracy of Dyadic Action Synchronization Affect Individuals’ Subjective Experience of the Interaction Partner and the Situation?.....	45
2. METHOD	47
2.1 Recruitment and Participants.....	47
2.2 General Procedure.....	49
2.3 Measures.....	50
2.3.1 Questionnaire Measures on Social Competencies and Attitudes.....	50
<i>Self-Report Scales on Situational Flexibility and Age-Specific Stereotypes.....</i>	51
<i>Others’ Report on Interpersonal Flexibility and Social Skills.....</i>	53
2.3.2 Central Measures in Individual and Dyadic Drumming Sessions.....	54
<i>Technical Implementation of the Dyadic Drumming Paradigm.....</i>	54
<i>Individual Drumming Sessions.....</i>	56
<i>Dyadic Sessions.....</i>	58
<i>Self-Report Measures in Individual and Dyadic Drumming Sessions.....</i>	58
2.3.3 Operationalization of Asynchrony.....	60

2.4 General Statistical Procedures.....	62
2.4.1 Data Structure.....	62
2.4.2 Bayesian Parameter Estimation Methods.....	64
<i>Bayesian Estimation Criteria</i>	65
2.4.3 Model Sequence and Model Notation.....	66
<i>Analyzing Differences in Dyadic Asynchrony (Research Questions I & II)</i>	67
<i>Predictive Effects of Dyadic Asynchrony on Individual Outcomes (Research Question III)</i>	70
2.4.4 Variable Distributions.....	71
2.4.5 Centering of Predictor Variables.....	72
2.4.6 Structure and Treatment of Missing Values.....	72
3. RESULTS	74
3.1 Age-Related Differences in Individual Predictors of Dyadic Asynchrony...	74
3.2 Variability in Dyadic Asynchrony.....	76
3.2.1 Variability in Dyadic Asynchrony as Explained by Differences Between Dyads and Individuals.....	77
3.3 Individual Predictors of Variability in Dyadic Asynchrony.....	78
3.3.1 Individual Asynchrony as an Individual Predictor.....	79
3.3.2 Interpersonal Flexibility, Situational Flexibility, and Social Skills as Individual Predictors.....	80
<i>Interpersonal Flexibility</i>	80
<i>Situational Flexibility and Social Skills</i>	81
3.3.3 Differentiating the Effects of Individual Asynchrony and Interpersonal Flexibility.....	83
3.4 Dyadic Predictors of Variability in Dyadic Asynchrony.....	84
3.4.1 Age-Group Compositions as Dyadic Predictors.....	84
<i>Follow-Up Analyses</i>	87

3.4.2 Differences in Dyadic Asynchrony Between Age-Group Compositions Explained by Individual Asynchrony and Interpersonal Flexibility.....	90
3.4.3 Excursus: Exploratory Analysis Including Age-Stereotypic Expectations.....	91
3.5 Variability in Dyadic Asynchrony Predicting Individual Experience.....	93
3.5.1 Experience of the Interaction Partner.....	93
3.5.2 Experience of the Situation.....	96
3.6 Summary of Results.....	97
4. DISCUSSION	99
4.1 Individual Antecedents of Interpersonal Action Synchronization.....	100
4.1.1 Sensorimotor Abilities.....	102
4.1.2 Social Competencies.....	103
4.1.3 Excursus: Are Age-Specific Stereotypes Related to Interpersonal Action Synchronization?.....	106
4.1.4 Summary and Conclusions.....	108
4.2 Developmental Perspective on Interpersonal Action Synchronization: Effects of Dyadic Age Compositions.....	109
4.2.1 Do Dyads with Younger Adults Show Higher Interpersonal Action Synchronization Accuracy than Other Dyads?.....	110
4.2.2 The Adults' Role in Interpersonal Action Synchronization: A Zone of Proximal Development for Children.....	112
4.2.3 Individual Asynchrony Is Related to Age-Associated Variability in Interpersonal Action Synchronization Accuracy.....	114
4.2.4 Summary and Conclusions.....	115
4.3 Consequences of Interpersonal Action Synchronization.....	116
4.3.1 Interpersonal Action Synchronization Accuracy Affects Individuals' Experience of the Interaction Partner.....	116
4.3.2 Interpersonal Action Synchronization Accuracy Affects Individuals' Experience of the Situation.....	118
4.3.3 Summary and Conclusions.....	118

4.4 Strengths and Limitations of the Present Dissertation.....	119
4.4.1 Strengths.....	119
4.4.2 Limitations.....	121
4.5 Directions for Future Research on the Development of Interpersonal Action Synchronization.....	122
4.5.1 The Dynamic Process of Interpersonal Action Synchronization.....	122
4.5.2 Beyond Self-Report: Behavioral Indicators of Interpersonal Flexibility.....	123
4.5.3 Neural Correlates of Goal-Directed Interpersonal Action Synchronization and Its Development.....	124
4.6 Final Conclusions.....	126
 5. REFERENCES	 129
 6. APPENDIX	 156
6.1 Appendix A: Method.....	156
6.1.1 Assignment of Dyads.....	156
6.1.2 Measures.....	157
6.1.3 German Instructions for Drumming Conditions.....	163
<i>Baseline & Posttest (Adults)</i>	163
<i>Children's Song: "Große Uhren" (traditional)</i>	164
<i>Baseline & Posttest (Children)</i>	165
<i>Dyadic Session</i>	167
6.1.4 Characteristics of Preferred Frequencies.....	168
6.1.5 First and Last Impression.....	169
6.1.6 Introductions of Self-Report in Individual Sessions.....	170
<i>Self-Report After Each Block/ at the End of the Session</i>	170

6.1.7 Algorithm Underlying the Measure of Asynchrony.....	173
6.1.8 Variable Distributions.....	175
6.2 Appendix B: Results	176
6.2.1 Distribution of Individual Asynchrony.....	176
6.2.2 Basic Models for Different Sub-Samples.....	177
6.2.3 Follow-Up Analysis: Variance in Baseline-Preferred Tempo as Predictor of Dyadic Asynchrony.....	178
6.2.4 Control Analyses: Situational Flexibility and Social Skills as Individual Predictors	178
6.2.5 Differentiating the Effects of Individual Asynchrony and Interpersonal Flexibility.....	179
6.2.6 Dyadic Predictors of Variability in Dyadic Asynchrony.....	178
6.2.7 Variability in Dyadic Asynchrony Predicting Individuals' Experience.....	182
LIST OF FIGURES IN APPENDIX	184
LIST OF TABLES IN APPENDIX	184
LEBENS LAUF	186
ERKLÄRUNG	187

LIST OF FIGURES

Figure 1.1. Theoretical model of the lifespan development of goal-directed interpersonal action synchronization.....	18
Figure 1.2. The working model: Investigating the development of dyadic action synchronization.....	38
Figure 1.3. The mediator model of the relationship between age group composition of the dyads and differences in individual precursors of dyadic action synchronization.	45
Figure 2.1. Overview of the general design.....	49
Figure 2.2. Model depicting the technical set-up of the drumming equipment.....	55
Figure 2.3. Example of drumming session setting.....	58
Figure 2.4. Example of procedure to calculate the measure of asynchrony.....	61
Figure 2.5. Schematic illustration of levels of analyses: Each individual included in four dyads.....	63
Figure 3.1. Dyadic asynchrony within one session by dyadic age-group composition.....	85
Figure 3.2. Mean positive stereotypic expectation towards a typical person in a specific age group (by age group).....	91
Figure 3.3. Change from first to last impression by high and low dyadic asynchrony (groups divided by median split).....	95

LIST OF TABLES

Table 1.1: Exemplary Research on Behavioral Synchronization.....	6
Table 1.2: Summary of Research Questions and Hypotheses.....	46
Table 2.1: Socio-Demographic Characteristics of the Sample by Age Group.....	48
Table 2.2: Mean Time Between Sessions in Days.....	50
Table 2.3: Overview of Questionnaire Measures on Social Competencies and Attitudes per Age Group.....	52
Table 2.4: Drumming Sessions Protocol.....	59
Table 3.1: Age-Group Differences in Individual Predictors of Dyadic Asynchrony.....	75
Table 3.2: Model 1: Characteristics of Between-Person and Between-Dyad Variability in Dyadic Asynchrony ($N = 144$)	78
Table 3.3: Model 2: Variability in Dyadic Asynchrony Explained by Individual Asynchrony ($N = 144$).....	80
Table 3.4: Model 3: Variability in Dyadic Asynchrony Explained by Interpersonal Flexibility ($N = 132$).....	81
Table 3.5: Model 4: Variability in Dyadic Asynchrony Explained by Situational Flexibility (Self-Report for Adults; $N = 36$).....	82
Table 3.6: Model 5: Variability in Dyadic Asynchrony Explained by Social Skills (Others' Rating for Children; $N = 30$).....	82
Table 3.7: Model 6: Variability in Dyadic Asynchrony Explained by Individual Asynchrony and Interpersonal Flexibility ($N = 132$).....	84
Table 3.8: Model 7: Variability in Dyadic Asynchrony Explained by Dyadic Age-Group Compositions ($N = 144$).....	86
Table 3.9: Model 7a & 7b: Variability in Dyadic Asynchrony Explained by Dyadic Age-Group Compositions (Sub-Samples).....	88
Table 3.10: Models 8 & 9: Variability in Dyadic Asynchrony Explained by Age-Group Compositions and Individual Asynchrony ($N = 144$) or Interpersonal Flexibility ($N = 132$).....	90
Table 3.11: Model 10a & 10b: Variability in Dyadic Asynchrony Explained by Age-Group Compositions and Age-Specific Expectations ($N = 135$).....	92
Table 3.12: Model 11a, 11b, & 11c: Prediction of Last Impression by Dyadic Asynchrony ($N = 54$).....	94
Table 3.13: Model 12, 13, & 14: Dyadic Asynchrony Predicting Positive Experience, Satisfaction, and Difficulty Within Drumming Situation ($N = 54$).....	96
Table 3.14: Overview of Research Questions and Summary of Supported and Unsupported Hypotheses.....	98