



Preface

This volume reflects an interdisciplinary scientific journey into a fascinating area of language talent. Officially, the journey started in February 2006, when the German Research Council (Deutsche Forschungsgemeinschaft-DFG) approved our grant proposal for a project “Gehirn-Korrelate der phonetischen Fremdsprachenbegabung”, shortly “The Brain & Language Pronunciation Talent”. All three of us (Ackermann, Dogil & Grodd) have a research record on the biological foundations of language; however, for a very long time we approached this topic from the perspective of *cortical deficiency* illustrated by aphasic, dysarthric and other populations with cortical disability. Around 2004 we were confronted and challenged by Dr. Susanne Reiterer with an idea of investigating biological foundations of language faculty from the perspective of *cortical efficiency* exemplified by especially talented language users. We discussed this new research perspective with a number of colleagues and students and were struck by its implications and its potential. The project started at a usual scale with Dr. Reiterer as a principal co-investigator in Tübingen and Dr. Giuseppina Rota as a co-investigator in Stuttgart. However, peer-to-peer propaganda before it even started has changed the project’s personal situation quite dramatically. Dr. Reiterer’s research idea was apparently so attractive that a whole “platoon” of young, multilingual, multicultural and exceptionally talented researchers joined in. Dr. Matthias Jilka, who established himself as a linguistic-phonetic leader of the project, was joined by Volha Anufryk, Henrike Baumotte, Natalie Lewandowski, all supported by a DFG Graduate School “Linguistic representations and their interpretation” in Stuttgart. Dr. Reiterer “recruited” Davide Nardo and Xiaochen Hu, both psychologists supported by DFG grants in Tübingen. Our extremely efficient student assistants Arev Anus and Jagoda Sieczkowska managed the pool of over 100 subjects, most of whom were phonetically recorded, psychologically tested and even brain scanned during the early phases of this project. The enthusiasm of all these people has enabled us to investigate “language talent” from several different angles. This book will show you how exceptional performance is correlated with personality, musicality, intelligence, memory span, sociolinguistic, psycholinguistic and detailed phonetic skills of more and less talented speakers. It will also give you new ideas about tests and methods of investigating language talent. We will try to convince you that





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efficiency in language learning (talent) is correlated with specific cortical efficiency which can be measured by neuroimaging methods. We even provide you with an example of a “language genius” which shows that once all the factors that foster talent come into play, there is virtually no limit to the number of languages that you can learn to speak – without an accent.

Enjoy

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Stuttgart and Tübingen, in May 2009*





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- Bongaerts, T., Planken, B. & Schils, E.
1995 Can late starters attain a native accent in foreign language? A test of the critical period hypothesis. In D. Singleton and Z. Lengyel (Eds.), *The age factor in second language acquisition*. Clevedon: Multilingual Matters, 30–50.
- Bongaerts, T.
1999 Ultimate Attainment in L2 Pronunciation: The Case of Very Advanced Late L2 Learners. In D. Birdsong (Ed.): *Second Language Acquisition and the Critical Period Hypothesis*. Mahwah: Lawrence Erlbaum Assoc.
- Carroll, J. & Sapon, S.
1959 *Modern Language Aptitude Test (MLAT): Manual*. New York: The Psychological Corporation.
- Carver, C. S. & White, T.L.
1994 Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, 67, 319–333.
- Costa, P. T. & McCrae, R. R.
1992 *Revised NEO Personality Inventory (NEO PI-R) and NEO Five Factor Inventory. Professional Manual*. Odessa, FL: Psychological Assessment Resources.
- Derwing, T., Munro, M. & Wiebe, G.
1998 Evidence in Favor of a Broad Framework for Pronunciation Instruction. *Language Learning*, 48(3), 393–410.
- Dogil, G.
2003 Understanding Prosody. In G. Rickheit, T. Herrmann and W. Deutsch (Eds.), *Psycholinguistics: An International Handbook*. Berlin: Mouton de Gruyter, 544–566.
- Féry, C.
1993 *German Intonational Patterns*. Tübingen: Max Niemeyer Verlag
- Flege, J. & Hammond, R.
1982 Mimicry of Non-Distinctive Phonetic Differences between Language Varieties. *Studies in Second Language Acquisition*, 5(1), 1–17.
- Flege, J. & Hillenbrand, J.
1987 Limits on Phonetic Accuracy in Foreign Language Speech Production. In G. Ioup and S. Weinberger (Eds.), *Interlanguage Phonology*. Cambridge, MA: Newbury House, 176–203.
- Flege, J.
1995 Second Language Speech Learning: Theory, Findings, and Problems. In W. Strange (Ed.), *Speech Perception and Linguistic Experience: Theoretical and Methodological Issues*. Timonium, MD: York Press, 233–277.
- Flege, J., Yeni-Komshian, G. & Liu, H.
1999 Age Constraints on Second Language Acquisition. *Journal of Memory and Language*, 41, 78–104.

