

International Workshop *Predictors of Reading*

Trondheim, April 10-11th, 2025

Location: Digs Trondheim (<https://meshcommunity.com/hubs/digs/>)

Thursday April 10th

9.30 – Welcome, Coffee & mingling

10.00 – 11.00 *Developmental trajectories of reading achievement: discriminating between the typical, delayed and atypical* - Joel Talcott, College of Health and Life Sciences, School of Psychology, Aston Institute for Health and Neurodevelopment (UK)

Background. More sensitively studying individual educational achievement over time, requires data from longitudinal studies sampled over multiple time points. Only by examining such developmental trajectories can we distinguish between patterns of delay or atypicality, or even determine whether that hypothetical distinction is meaningful. Although many longitudinal studies of reading development exist, there have been few attempts to model developmental trajectories for individuals and no systematic comparison of growth functions to see how they fare in this context. Methods. We systematically modelled and evaluated the individual developmental trajectories of exception word and pseudoword reading in 513 children tested longitudinally at 5 time points between the ages of 4 and 11 years. We compared the trajectory fits across two families of growth functions: the Garcia family (including the well-known Logistic and Weibull functions) with the Gamma family (the cumulative density function of the gamma probability distribution, characterised by a shape and rate parameter). Results. Although both approaches adequately modelled the observed measurements, the fits from the Gamma functions were significantly more accurate, easier to compute, and yielded trajectory parameters that were more readily interpretable. Based on their developmental trajectories, we identified six clusters of individuals. The largest cluster comprised children who became competent readers of both word types and who showed average values for their shape and rate of development, whereas the other clusters were characterized by more extreme values in at least one of these parameters. There were also significant differences between the clusters in terms of their reading outcomes, suggesting that early determination of probable trajectories may provide some prospective prediction of future development. Conclusion. The Gamma family of growth functions, provides an accurate way of modelling developmental trajectories, produces results that are readily interpretable, and which may be helpful in the early identification of children with different patterns of reading achievement, associated with delayed and atypical trajectories. Beyond demonstrating the optimal means for fitting individual data to growth curves, it is important to show that variability of fit across individuals. Variation in the growth trajectories observed can be associated with different reading achievement outcomes and which may be predicted in part from measures obtained at baseline.

11.00 - 12.00 *Executive function and reading comprehension in atypical readers* - David Saldaña, Individual Differences, Language and Cognition Lab, University of Seville (Spain)

Individuals with atypical reading patterns, such as those on the autism spectrum, frequently exhibit a profile characterized by poor reading comprehension. Like typically developing individuals, the discrepancy between decoding and comprehension in these atypical readers can be attributed to delays in oral language, consistent with the simple view of reading. However, extensions and alternative models to this view have highlighted the significant contributions of general executive functions as well as reading-related executive and self-regulatory processes. In my presentation, I intend to analyze the role these elements may play in explaining poor reading comprehension among atypical readers who are otherwise not defined by their reading comprehension profiles, especially in the case of autism, and to determine if this role diverges from that observed in typically developing readers.

12.00 – 13.30 Lunch (served in open area on location)

13.30 – 14.30 *Individual Differences in Reading: A Statistical Learning Approach* - Jay Rueckl, Psychological Sciences, UCONN (USA)

Recent theoretical and empirical advances in the science of reading, cognitive neuroscience, and artificial intelligence suggest that learning to read entails the attunement of the reading system to the myriad statistical regularities embodied by the writing system. In this talk I'll review these advances with a specific focus on individual differences. Our research demonstrates that better readers are more successful in leveraging the statistical information embedded in print and, conversely, that struggling readers rely more on less reliable, more idiosyncratic sources of information. Implications for both theory and practice will be discussed.

14.30 – 15.00 – Coffee & pastry

15.00 – 16.00 *Reading and chunking mechanisms* – Arnaud Rey, Centre de Recherche en Psychologie et Neurosciences, CNRS | Aix-Marseille Université Marseille (France)

The capacity to recognize the statistical patterns within language, and more generally within our environments, is a fundamental aspect of human cognition. This process, referred to as implicit statistical learning, is believed to depend on associative processes, particularly chunking mechanisms. In this talk, I will argue that the central role of chunking mechanisms was recognized as early as the first models of reading (e.g., Laberge & Samuels, 1974) and that there has since been considerable empirical evidence in favor of these mechanisms. Paradoxically, however, no recent computational model of reading gives them the slightest place, suggesting the existence of a fundamental error within these models. I will conclude by arguing that the best way to finally give them the place they deserve would be to challenge these models with large developmental databases at the item level in pseudoword reading aloud.

16.00 – Discussion

18.00 – Workshop Dinner with a visit at the Museum of Norwegian Rock, Rockheim Trondheim (<https://rockheim.no/>)

Friday, April 11th

From 9.30 Wake up coffee

10.00 – 11.00 *Unpacking reading experience: how book language provides the statistics for reading (and more)* - Kate Nation, University of Oxford (UK)

Reading is a complex skill and learning to read takes time and effort. Much is known about the factors that predict individual differences in reading and its development. Critically however, we know relatively little about how children become expert. How do children move from the laborious process of ‘sounding-out’ individual words to the sense of effortlessness that we, as skilled readers, experience as we read? Broadly, the answer to this question is practice: reading is a skill and like all skills, practice is needed for expertise to emerge. For reading, practice may be important in two distinct ways: not only does it allow basic skills to be honed and fine-tuned, reading experience itself provides the substrate by which the statistical properties of the writing system become embodied in the child’s own reading system. This talk will consider how reading experience shapes learning, such that children become expert and written words become familiar. The talk will make connections between corpus explorations of large datasets of books written for children (the substrate from which patterns are learned) and psycholinguistic experiments, and we will also consider how the language of the book might shape aspects of development beyond language and literacy.

11.00 – 12.00 *The literate brain: An update on neuroimaging studies of language development, reading, and reading disability* – Kenneth R. Pugh, University of Connecticut/Yale University School of Medicine/Haskins Labs (USA)

Good reading skills are crucial for success in the modern world. Reading disability (RD) is characterized as a brain-based difficulty in acquiring fluent decoding skill, usually associated with problems in operating on the phonological structures of language. I will review research from our lab and others which indicates that atypically developing RD children fail to develop key left hemisphere brain “circuits” that, in typically developing (TD) readers, come online to support skilled reading. New discoveries on how genetic, neurobiological, and environment factors impact early language development and later reading outcomes will be discussed in this context. I will also present an overview of the latest research from our lab on the brain-basis of treatment and remediation of language and reading difficulties (in multiple languages), including new research using multi-modal brain imaging during learning with the larger goal of tailoring instruction to individual differences in brain organization.

12.00 – 13.00 Lunch (open area on location)

13.00 – 14.00 *Early prediction of reading and language abilities from prenatal and postnatal neurocognitive development* – Marco Tettamanti, Department of Psychology, University of Milano-Bicocca (Italy)

Recent advances in in-vivo foetal neuroimaging have contributed to a finely detailed picture of the anatomo-functional hallmarks that define the prenatal neurodevelopment of auditory and primordial language networks. I will first outline the available evidence, in connection to the emergence of the prenatal readiness for sound and speech processing, as a crucial prerequisite for subsequent language acquisition. Secondly, I will present new evidence based on resting-state functional brain measures, showing how the spectrum of diverse neurodevelopmental trajectories characterizing the prenatal and preterm neurodevelopment is associated with varying degrees of postnatal language processing abilities. Finally, I will discuss ongoing research on the value of newly developed reading-free neuropsychological assessments and multimodal functional and structural magnetic resonance imaging for the longitudinal prediction of the insurgence of developmental dyslexia and other developmental language disorders in early school years.

14.00 – 14.30 Coffee & pastry

14.30 – 15.30 *The effects of early cognitive precursor skills on children's reading development in primary school in Germany* - Sascha Schroeder, Educational Psychology, Georg-August Universität, Göttingen (Germany)

In the OpeRA (Orthographic Processing in Reading Acquisition) study, we followed-up $n = 100$ German primary school children longitudinally from the begin of grade 1 to the end of grade 4. Children were assessed twice a year using measures of word and non-word reading fluency as well as sentence comprehension. At the first measurement point, right after school entry, children worked on an extensive battery of tasks that tapped into different component processes relevant for the dual-route cascaded model (DRC) model of visual word recognition (i.e., visual-orthographic, lexical, and sub-lexical processing) as well as other cognitive skills, such as non-verbal intelligence, visual attention, and sensorimotor processing. In the present talk, we will report the differential effects of the various cognitive precursor skills assessed at T1 on the development of the different outcome variables assessed at T2-T8. Overall, results show that growth of the various literacy skills was well described by a quadratic growth function with de-accelerating growth in later grades. Importantly, component skills assessed at T1 predicted children's level of reading skill at the begin of reading instruction as well as their development across primary school. In particular, variables associated with lexical processing strongly affected children's development of word reading fluency while non-word reading fluency was mainly driven by visual-orthographic processing. The development of children's sentence reading skills was predicted by similar variables as single word reading fluency but was also affect by children's early visual-attentional skills. Results are discussed with regard to extant models of reading and literacy acquisition.

15.30 – Closing discussion

Organisers:

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