

Effects of cognitive, linguistic, and environmental factors on brain development for language in children 0-8 years: Connections to successful reading acquisition.

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Reading depends on the extraordinary learning capacities of the developing human brain. Early language and cognitive experience needs to be rich and varied in order to create the brain readiness for the later development of fluent reading skills and creative cognitive skills. Moreover, early brain development for language and cognition depends, on adequate language stimulation in the pre-school environment and evidenced based approaches to literacy instruction during transition. Brain-imaging techniques now allow us to now explore the neurobiological foundations of early language learning and later reading acquisition (and reading disability (RD)). A major focus of this presentation will be on the extensive research conducted at Haskins Labs and elsewhere on the development of speech perception and production abilities in infants and toddlers and how this relates to later neurocognitive outcomes related to literacy and other cognitive abilities. Work on infant development includes: influences of early health and nutritional factors, genetics of language disorders, study of those brain systems supporting language, the effects of caregiver interactions and enriched environment, bilingualism, and early markers of risk for neurocognitive disorders

such as Specific Language Impairment, Dyslexia, and Autism associated with atypical speech production milestones. The major theme here is on how to work with infants and toddlers to create brain readiness for later creative learning upon entering school.

We will also discuss our recent work with young school-aged children examining both typically developing children and best practice for learning to read, and neural plasticity associated with good treatment and remediation for atypically developing children. In studies carried out with children of different ages and with different brain/behavior development levels, we have seen that successful reading acquisition is associated with the development of reading specialization in three important parts of the language dominant left hemisphere. Our recent studies have been focused on early brain development; the influence of intensive remediation and instruction on the development of the left hemisphere reading system. The beginning reader needs to create efficient links between brain regions specialized for vision and language; our recent longitudinal research reveals brain mechanisms necessary to begin this developmental process. RD readers, if untreated, fail to engage these critical regions in the left hemisphere during tasks that make demands on phonological processing and reading. Exciting new results from several learning and treatment studies suggest that good instruction and training can have profound and positive effects on the brain systems that are critical in fluent reading in both younger and older children. Learning about the neurobiological basis of reading

will give teachers a wider view of the reading process and of reading itself, and it will provide guidelines to specialists about how these new techniques can aid in both early detection of "high risk" children for reading comprehension problems and best practice for typically developing children in terms of transition to literacy from pre-school to school.