Reading is a relatively recent skill in human history, emerging long after language, which raises the question: how does the brain adapt to support literacy? This project explores the development of a brain region called the Visual Word Form Area (VWFA), located in the left ventral occipitotemporal cortex (lvOT), which becomes specialized in recognizing written words. Although this area is crucial in literacy across different languages, scientists still debate how it develops. The study aims to answer three key questions: (1) How does the brain develop specialized regions for experienced-shaped skills like reading? (2) Does the neural basis for speech processing help to determine where the Visual Word Form Area (VWFA) develops? And finally (3) Is impairment in reading (dyslexia) linked to atypical word recognition in the lvOT?

To explore these questions, the project will follow 120 children from ages 5 to 9, from pre-reading through third grade, using behavioral tests and brain scans. These will be done at three stages: before children begin reading instruction, during early reading, and three years after reading starts. The goal is to understand how the brain's structure and function develop as children learn to read. Using functional scans, researchers will measure how the brain responds to among all: words, faces, and objects, while structural scans will track connections between brain areas related to language and other brain networks.

A major focus of the project is whether parts of the brain involved in processing speech also help shape the VWFA before reading begins. By comparing how the brain responds to both speech and print, the researchers will test two different ideas: (1) the Print-to-Speech, which suggests the lvOT first responds to printed words, then connects them to speech, and (2) the Speech-to-Print, which proposes that the lvOT first responds to speech sounds, and later adapts to recognize written words.

At the final stage of the study, children will be tested for dyslexia. This will help identify whether children with dyslexia have different brain patterns and connections compared to typical readers from the beginning of reading acquisition and even earlier - at the pre-reading stage.

What makes this project so valuable is its long-term, multimodal approach. By examining not only visual processing but also the role of speech in shaping reading-related brain regions, the research could reveal new insights into brain plasticity and how experience changes the brain. It also help for earlier detection of dyslexia by identifying brain markers that signal reading difficulties, with the potential to improve educational interventions for children who struggle with reading.