

The cerebellum's relationship to language function by Sophia Tchir | Carolina Vias | Jairo Munoz | Jefferson Salan | Steven L. Small | Anthony Steven Dick

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The idea that the cerebellum impacts language function and development is currently supported by a small but increasing number of empirical studies. This theory is further strengthened by the recognized cerebellar-ponto-cerebellar connectivity between the left perisylvian cortex and the right cerebellar hemispheres, particularly lateral regions Crus I, Crus II, and VIIb. To study the relationship between tissue volumes of manually parcellated sub-regions of the cerebellum in structural MRI and a variety of receptive and expressive language measures, we looked at 18 typical individuals (aged 9-38 years). This initial data indicated a relationship between expressive language and the volume of lateral cerebellar sub-regions. To create a laterality index across regions, we calculated the volume of cerebellar sub-regions and determined $\text{difference} = (\text{right} - \text{left}) / (\text{right} + \text{left})$ for the Crus I, Crus II, and VIIb regions. These difference scores were then connected to language outcomes. Our results showed that better expressive language scores on the Clinical Evaluation of Language Fundamentals CELF-expressive; $p < .01$) were predicted by greater volume of the right VIIb region, and greater volume of the right Crus I region was correlated with worse performance ($p < .01$). The Crus II difference measure ($p > .05$) yielded no associations. Though these findings are introductory, they may allow for the development of therapeutic methods for language recovery after cortical insult through better understanding of cerebellar function and its connections to language.