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**THE ASSESSMENT OF EXECUTIVE FUNCTION IN CHILDREN:  
A DEVELOPMENTAL PERSPECTIVE**

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## ABSTRACT

The Cognitive-Neurological Model (CN Model) of executive function, derived from examination of Piagetian concepts of 'assimilation', 'accommodation' and 'equilibration' and Fuster's (1993) working model of prefrontal cortex functioning, was used to guide the development of paediatric measures of executive functioning.

Four computer-based psychological measures, based on the CN Model, were developed. Together with the Wisconsin Card Sorting Test, the Austin Maze, The Auditory Verbal Learning Test and a measure of school ability, these developmental measures were administered to a carefully selected non-clinical sample of 183 boys. Three age ranges of 7-8 years, 9-10 years and 11-12 years, corresponding to Piagetian stages of cognitive development, were separately analysed. The developmental measures are based on the Tower of Hanoi (Seals Task), the Balance Beam, a Visual Scanning task (Fish), and an AB Visual Displacement Task (Piggy Bank).

Factor analysis of results indicate three underlying factors which have been labelled Memory/Learning, Executive Function and Inhibition. Only the Executive Function factor demonstrates a developmental improvement with age. The MANOVA canonical loading for the Executive Function factor accounts significantly for the majority of variance that separates the three age groups. The Seals task and Balance Beam loaded significantly on the Executive Function factor, while Fish and Piggy Bank loaded significantly on the Inhibition factor, but not on the other two dimensions. The Seals test was, by far, shown to be the most powerful and sensitive measure of executive function.

A notable feature of the results, particularly for executive function tests, is the decrement in, and instability of performance of the 9-10 year age group in relation to the other two age groups. This phenomenon, which is labelled "vertical decalage", is discussed in relation to neurobiological changes that occur around 9-10 years of age. A re-examination of data from earlier studies finds support for the presence of the vertical decalage phenomenon.

The Seals task is the only measure which significantly separates a group of twenty 9-10 year old brain-injured subjects from a matched normative group. The Seals test demonstrates high specificity and Negative Predictive Power and, as such, is recommended as a 'second-stage'

diagnostic tool for the detection of brain damage in children. It is concluded that the Seals test has clinical utility as a paediatric measure of executive function. Further research is recommended to confirm the robustness of the developmental measures of executive function and to develop the predictive validity and utility of the CN Model.

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