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Introduction to the Assessment of Attention and Executive Functioning

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This special issue is concerned with the neuropsychological assessment of two related, multifaceted constructs: attention and executive functioning. Many of the instruments used to assess these constructs have been *ad hoc*; only relatively recently have measures that combine adequate psychometric properties, ecological validity, and a sound theoretical grounding become available to the clinician.

The term "executive functions" is a convenient shorthand for a set of behavioural competencies which include planning, sequencing, the ability to sustain attention, resistance to interference, utilisation of feedback, the ability to co-ordinate simultaneous activity, cognitive flexibility (i.e. the ability to change set), and, more generally, the ability to deal with novelty. The neural substrates of these competencies are considered to lie in the prefrontal cortex. Executive deficits can have a much more profound effect on a client's prospects for successful adjustment than the more circumscribed deficits arising from posterior lesions (Crawford, Venneri, & O'Carroll, 1998). However, these former deficits have proven hard to quantify (Reitan & Wolfson, 1994) and as such can be regarded as constituting the most problematic area in neuropsychological assessment. As Shallice and Burgess (1991) and others (Lezak, 1995) have noted, most conventional neuropsychological tests fail to capture the core difficulties faced by the client with executive dysfunction as they are typically highly structured, deal with circumscribed material, and the criteria for success are clearly specified.

Included in the present issue is a paper on the development and validation of a new battery of executive tasks, the Behavioural Assessment of the

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Dysexecutive Syndrome (BADS). The emphasis in many of the BADS subtests is on requiring the client to impose structure on the tasks and to engage in forward planning. One potential danger in using unstructured tasks is that inter-rater reliability will be low, however, the inter-rater reliability coefficients for all BADS subtests are more than adequate. Another impressive feature of the BADS, shared with other tests from the same stable, is its demonstrated convergence with observational ratings of everyday problems in the same domain.

This special issue also contains a study (Clark & O'Carroll) of the relationship between one component of the BADS (the Modified Six Elements Test) and rehabilitation status in schizophrenia.

The sensitivity and specificity of the Wisconsin Card Sorting Test (WCST) (Grant & Berg, 1948; Heaton, 1981) to detect executive problems following frontal lesions has been found wanting (Mountain & Snow, 1993). In the present issue Bowden, Fowler, Bell, Whelan, Clifford, Ritter, and Long examine some fundamental psychometric properties of this test and conclude that the WCST is unsuitable for use in clinical practice because of problems with temporal stability and internal validity.

Turning to coverage of the assessment of attention, the Paced Auditory Serial Addition Test (PASAT) has proved itself to be a useful clinical instrument in work with head-injured populations in that it is very sensitive to the effects of mild injury (McMillan & Glucksman, 1987) and is a powerful predictor of later employment status (Brooks, McKinlay, Symington, Beattie, & Campsie, 1987). Two studies in the present issue (Chronicle & MacGregor; and Crawford, Obonsawin, & Allan) examine the construct validity of PASAT and specifically test the claim by its developers that performance "is not significantly correlated with either general intelligence or arithmetic ability" (Gronwall & Wrightson, 1981, p. 889). The latter study also presents a regression equation to estimate an individual's premorbid PASAT performance from their age and performance on the National Adult Reading Test (Nelson & Willison, 1991).

As noted, the assessment of attention and executive functioning is arguably the most problematic area of assessment for those working with adult populations. However, these difficulties pale in comparison with the complexities facing the child neuropsychologist. A significant contribution to addressing the need for valid and practical measures in child neuropsychology has been made by the University of Melbourne group. The present issue contains two empirical papers from this group and a review of executive functioning in children. The special issue closes with a review of recent developments in the clinical assessment of attention in head-injured adults.

A feature of two of the papers in this issue (Bowden et al; Crawford et al.) is their use of confirmatory factor analytic techniques to evaluate the construct validity of neuropsychological instruments. The negative attitude of many

neuropsychologists to factor analysis was formed on the basis of experience with conventional exploratory factor analytic methods such as principal components analysis and principal factor analysis. Exploratory factor analysis (EFA) imposes arbitrary constraints (factors must either all be orthogonal to each other or all must be correlated; correlated errors between manifest variables can not be modelled) while at the same time prevents the user from imposing substantive (i.e. theoretically important) constraints. These limitations do not apply to confirmatory factor analysis (CFA). However, the major advantage of CFA is that *inferential* statistics can be used to evaluate the fit of a hypothesized model and to compare it with competing models derived from theory or prior empirical findings (with EFA there are no hard, statistical grounds for preferring one solution over another). An excellent general introduction to the use of CFA in research on clinical measurement has been provided by Cole (1987) who gives a number of examples of approaches to the use of CFA that could profitably be adopted in research on neuropsychological assessment.

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