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### Neuropsychological functions across the world—common and different features: From digit span to moral judgment

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## Preface

# Neuropsychological functions across the world— common and different features: From digit span to moral judgment

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Experience influences the development of the nervous system; and the brains, minds, and actions of people from different cultures are both similar and different. The description and understanding of such similarities and differences is a major theme of the emerging field of transcultural neuropsychology. In clinical practice as well as research and theory, the neuropsychologist in a “globalized” world will increasingly be expected to take cultural influences into account, not as interfering variables of nuisance, but as factors of basic neurobiological importance and far-ranging behavioural effects.

Little is known about the cross-cultural aspects of even the most commonly used neuropsychological tests and methods of rehabilitation. Which cultural variables (i.e., formal and informal characteristics of education) affect the performance of a particular task? To what extent can test norms be transferred from one country to another? Does a given test reflect brain activity in the same way in different cultures? What do we currently know about the biologic bases and the processes that lie behind the emotions and their alterations? How should rehabilitation programs be composed in different cultural settings, and in what way should outcome best be evaluated?

This Special Issue is a first step towards the analysis of the similarities and differences of several neuropsychological measures, from digit span to moral emotions, across different languages and different cultures. With regard to neuropsychological rehabilitation, given the interaction of

cognitive, behavioural, psychological, and physical factors, clinical data has shown that patients are best served by a comprehensive, multidisciplinary, and neuropsychologically oriented rehabilitation. The principles of the holistic approach and its application to different countries are presented.

The article by Ardila, Ostrosky-Solís, and Bernal: *Cognitive testing toward the future: The example of semantic verbal fluency (ANIMALS)*, outlines four criteria that psychological and neuropsychological testing should fulfil. They point out that, ideally, a neuropsychological test should be contained in an international database, with normative test results obtained from subjects of different ages and with different levels of education (including illiteracy). The effects of brain damage on different aspects of performance of the task should be known, as well as the pattern of brain activation that occurs during the performance. Finally, it is valuable to know how the test of choice correlates with other tests. The four criteria are applied in an analysis of semantic verbal fluency.

Digit span forward and backward is the most commonly used measure of immediate verbal recall, attention capacity, and working memory, and the test is commonly regarded as relatively culture-free. In the article *Digit span: Effects of education and culture*, Ostrosky-Solís and Lozano studied digit span performance in 2574 Spanish-speaking individuals and compared the findings with data collected in 14 other countries on five

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continents. It was found that, contrary to the common belief that this task is a culture-free test, variables such as age, education, and country all made a difference. The reasons for this variability are not clear; however, the authors discussed the possibility that learning to read and write might affect the development or usage of the abilities measured by the digit span task, and that cultural variables such as language and quality of education might also contribute to the differences found between countries.

In contrast to digit span, other neuropsychological measures could be relatively culture-fair tests; this is the case for phonological verbal fluency. Phonological fluency is an economical, easily administered, and expedient test, which appears to be sensitive to many forms and different levels of brain dysfunction. Hence, it is a useful tool for following improvement or deterioration in a patient's neuropsychological status. Although it is a frequently used test, cross-cultural studies comparing phonological verbal fluency in different languages are scarce. In the article *Cross-linguistic meta-analysis of phonological fluency: Normal performance across cultures*, Oberg and Ramírez analyse the influence of education, culture, and primary language the phonological verbal fluency of 926 neurologically intact subjects from five different countries: Mexico, Argentina, Denmark, USA, and Israel. Results suggest that level of education has an influence on the number of words produced, and higher-frequency letters produced a higher number of words in all languages. The authors point out that as long as years of education and letter frequency within each language were considered, the number of words generated were remarkably similar across languages and across countries.

Emotions are a crucial aspect for neuropsychological function in normal and pathological conditions. Emotions are central to the solution of basic problems and to interpersonal relationships. Patients with orbito-frontal damage, in spite of maintaining a high intellectual coefficient, behave irrationally and do not consider the consequences of their actions. Neurobiological and neuropsychological research has started to study the neural correlates of basic and complex or secondary emotions like moral behaviour. The study of moral emotions and its disorders is reviewed by Vélez García and Ostrosky-Solís in the article *From morality to moral emotions*. They emphasize that moral emotions differ from basic emotions (sadness, joy, anger, fear, surprise, disgust) in that they are intrinsically linked to the welfare interests of each society in terms of the welfare of

individuals. In this way, moral emotions spring from the interaction between individuals or when moral violations are perceived. It has also been suggested that, unlike complex deductive reasoning, they appear rapidly, and automatically, and that there is a cognitive assessment that is unconscious of interpersonal events. Moral emotions are critical for promoting cohesion in groups. Guilt, gratitude, and compassion are examples of prosocial moral emotions. However, moral emotions can also act to promote social dissolution and reorganization. Such emotions include contempt, indignation, and xenophobia. The article includes a review of the latest findings on the biological and evolutionist bases of emotion, and presents data regarding the neural correlates of moral emotions.

Diagnosis must be linked to rehabilitation. Rehabilitation is a process whereby people who are disabled by injury or disease work together with professional staff, relatives, and members of the wider community to achieve their optimum physical, psychological, social, and vocational well-being. Holistic neuropsychological rehabilitation was developed by Ben-Yishay and his associates, and it has now been implemented in more than 20 different countries. In the article *Ego-identity: Can it be reconstituted after a brain injury?* Biderman, Daniels-Zide, Reyes, and Marks, collaborators of Ben-Yishay, discuss how ego-identity can be reconstituted after brain injury. It is argued that intervention must start with building awareness and understanding of functional deficits. As such insight is established, and the patient accepts intervention from others, intense cognitive training and psychotherapy lead to the final stage of treatment, where identity is reconstituted and the patient finds a new meaning in life.

The clinical application of this program is presented in the article *Holistic neuropsychological rehabilitation in Finland. The INSURE program: A transcultural outgrowth of perspectives from Israel to Europe via the USA*. The authors Sarajuuri and Koskinen applied the holistic model to Finnish patients with traumatic brain injury (TBI). The INSURE is a post-acute, interdisciplinary, 6-week rehabilitation program for selected groups of TBI patients. The core of the program is neuropsychological rehabilitation and psychotherapy with vocational interventions, and follow-up support. The authors discuss their personal experiences and ideas for the future in the field of holistic neuropsychological rehabilitation in terms of ongoing research work, computer-administered cognitive remediation, and quality of life assessment.

We hope that this issue will contribute to a broader awareness of transcultural issues in neuropsychology, and stimulate development of both basic knowledge and clinical skills for work with clients whose cultural backgrounds

may be different from that of the neuropsychologist.

In the longer perspective, an interdisciplinary understanding of culture–brain–behaviour relationships is bound to emerge.