Lessons Learned from Neurobiology

Jan van Dijk 1, Catherine Nelson 2

The Deafblind International (DBI) Conferences have been very important forums in which to learn and evaluate state-of-the art theory and practice regarding the education of persons with deafblindness. Initially, the focus of the conferences was on practical issues of teaching congenitally deafblind children, but over the years, a broader perspective has developed. This perspective was reflected in the inclusion of relevant information from other disciplines. For example, the field of genetics informed us about specific syndromes, audiology told us about new testing methods and useful prostheses, and ophthalmology, about early intervention to prevent the worsening of a child’s eyesight. Clinical psychology and psychiatry informed us about psychiatric problems and challenging behaviours experienced by persons who are deafblind and occupational therapy informed us about sensory integration. All were welcomed as we strove to meet the medical, social, psychological, and educational needs of deafblind persons. It is now time to introduce another field; neurobiology.

There is general agreement that children who are now diagnosed as being deafblind are often very neurologically involved. Many of the children also have severe orthopaedic problems, some are very medically fragile, and some, exhibit undesirable behaviours (e.g., self-injurious behaviours, aggressive outbursts). A recent study by Fellinger et al., in 2009 found that over 20% of persons with severe intellectual disability in an institution in Austria met the diagnostic classification for being deafblind. Yet only a small percentage of the individuals were so identified prior
to the research. In this brief article, we would like to highlight some of the new research that utilizes neurobiology and has the potential to help the population of individuals with multiple disabilities in addition to deafblindness.

It is our belief that recent research studies on stress can shed some light on very important issues of behaviour and learning of persons with deafblindness. Scientific methods have been developed to determine a person’s stress level through measuring the hormone, cortisol. As has been demonstrated, prolonged periods of stress are devastating for the neurological growth of the child and the development of his social behaviour. (Lee, Ogle, & Sapolsky, 2002; Shonkoff & Phillips, 2000; Van Dijk 1999). In a recent study using cortisol levels as a measure, Sterkenburg (2008) demonstrated that a combination of relational therapy (attachment) and techniques of behavioural support reduced unfavourable stress levels in a sample of multiple disabled blind children and adolescents and thus, positively changed their behaviour. Similar findings have been reported in children in foster care children (Dozier 2006).

There is considerable evidence that many persons with concurrent disabilities of hearing and sight experience much anxiety which may express itself in inappropriate behaviour. It has been found that this is due to a disregulation of the amygdala, an organ located deep within the brain. It is an important structure in fear conditioning and the recognition of potential threats. The amygdala has many connections with other brain areas and so a threatening experience with one person (e.g., abuse) can generalize to other persons. Even when such fearful persons are approached in a gentle way, there may a substantial emotional reaction. This behaviour can often be observed in persons with deafblindness but it has been found that the introduction of an intensive system of reinforcement can lower the fear reaction significantly (Arden & Linford 2009).
Another example of the use of neurobiology is seen in the field of Autism. The field of deafblindness is increasingly becoming aware of the possible relationship between children with deafblindness and Autism Spectrum Disorder. The discovery of mirror neurons is very important to understanding the role that both hearing and sight play in development. The mirror neuron system (MNS) mediates emotional recognition within the observer who feels a similar emotional state to the one being observed (Van der Gaag, et al., 2007). This matching system is very important as we understand and correctly interpret facial expressions. This understanding can be considered the basis for social development.

The above are just a few examples of recent findings that are extremely important for researchers and practitioners who work with individuals who are deafblind. Such findings demonstrate that our behaviour is very much related to processes in our brain. In her keynote address to the 2009 DBI conference in Italy, Professor Marlene Janssen mentioned that quality of life is a concept that should be explored in depth. We agree with this, but would like to add that this research should focus not only on cortical functions, but also examine the fundamental role our emotional brain plays in the well being of individuals who are deafblind. As we examine the emotional brain, it is also incumbent upon us to look at relationships. It seems that the intensive relationship between caregiver and the child triggers a system in the human brain which leads to a feeling of happiness and joy in both partners. This is the phenomenon of resonance that has been the focus of much of our early research.

It is true that for many practitioners, research findings are not easily accessible, therefore we have decided to develop an instructional DVD with many clips of children with serious cognitive impairments but who have still a vast
repertoire of feelings and emotions. This production will be called *Let’s talk Limbic.*

*The role of the emotional brain in education and care for persons with multiple sensory impairment.* We are working on this project with a multi-disciplinary team of professionals (Drs. Nelson, Fellinger, De Kort, Van Dijk & Van Dijk). In order to keep our colleagues up to date on a number of exciting developments in the adjacent fields, there will be a web site opened during 2010 with an advisory board comprised of several professionals in our field: Drs. Silberman, Bruce, Janssen, Nelson, and De Kort. We will give you further information in the next DBi Review.

**References**


1) Jan van Dijk, Ph. D. Emeritus Professor Radboud University and Head Deafblind Department, Sint-Michielsgestel

2) Catherine Nelson, Ph.D. Assistant Professor, University of Utah. USA