

Dyscalculia: efficacy of cross-hemispheric exercises

Editorial

Research on brain lateralisation and applications to enhance learning for those with disabilities and difficulties has been ongoing since the 1930's, although not much has filtered through to the Educational Psychologists or Teachers in the public school systems in recent times. The book "Brain Lateralization in Children: Developmental Implications" Molfese DL et al.,¹ which compiles and reviews the enormous body of both pure and applied research conducted between 1937 (Orton) through research on dyslexia conducted by University of Pittsburgh School of Medicine in the public schools of Pittsburgh in 1987.² For example, in one meta-analysis study involving 54 studies, models of disturbed laterality were explored and one of the main underlying causes was "interhemispheric communication problems" which is supported by the neuropsychological and cognitive psychology research of Prof. John R. Kershner at the University of Toronto. His recent research (2014) in the Journal of Learning Disabilities "Forced-attention dichotic listening with university students with dyslexia: Search for a "core deficit" is further proof that this ongoing area of research remains current and provides evidence in support of cognitive behavioural approaches involving cross-lateralisation exercises.³

Special needs schools in Australia from the 1970's through to the 1990's based a large part of the curriculum and strategies for teaching on this line of research and many teachers known to the author, who, as children suffered from learning disabilities and difficulties, attended these schools and as a result went on to university and became successful teachers. However, these schools were abolished in the name of "inclusivity" in the 00's and with them many of the successful strategies have been lost in the name of equity and fairness for all, with very few School or Educational Psychologists or Teachers of today implementing these techniques in the classroom. A former acquaintance, who had never been able to read above a 3rd grade level was assessed by a neuropsychologist in 1992 and diagnosed with dyslexia. Her report was provided to the local TAFE in NSW Australia, who used her recommendations for cross-lateralization hemispheric exercises to strengthen the neuronal connections between the lobes of the brain. Today we might call this "neuroplasticity" and "brain training" Wall JT et al.,⁴ however the first research demonstrating the efficacy of the brain training was conducted by Orton.⁵ Thus, it appears that the technique was occasionally being implemented in Australian public educational institutions, at least in NSW in the 90's.

Recently, however, an Action Research approach was implemented in a Tasmanian private school setting, where a grade 10 math class full of children were assessed on the PAT and averaged on the 3/4th grade levels at the beginning of the school year. The Vice Principal, familiar with the research from New Zealand and in rehabilitation of disabilities and learning difficulties, allowed the classroom teacher to incorporate cross-lateralisation exercises into the lesson planning for the class, as there were several children with official diagnoses of SLDs and several other children who probably had similar issues, described as symptomatic of dyscalculia were observed, but due to family circumstances and lack of access to a Registered Psychologist and proper Psychometric assessments, were undiagnosed. Knowledge of the multiplication tables averaged around the 3's times-tables and with exercises, this improved by 43% within the first term, so class

Volume 2 Issue 4 - 2015

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average was around the 6's and continued to improve throughout the year with only one child in the class failing to complete the table correctly by the end of the year. However, other improvements in overall math skills and abilities also improved dramatically, as a result of the cross-lateralisation and hemispheric integration exercises and by the end of the year the PAT levels for the class averaged at year 10 standard, or just below in the year 10 band of expected normalized performance for their age cohort.

The correlation between dyslexia and dyscalculia is well known in the research, however, research on dyscalculia is lacking. Although some academics are of the opinion that inter-hemispheric training exercises are controversial and lack evidence, there is a huge body of research in neuropsychology and clinical psychology that supports its application in educational settings. Subtypes Ignored. In the same way that some subtypes of Autism Spectrum Disorder (i.e. formerly Asperger's) may be highly correlated with symptoms of anxiety, subtypes of dyscalculia (in ICD-10) can also be highly correlated with advanced processing abilities especially in language and visual memory in LTM allowing the Talented and Gifted subtypes extraordinary abilities for retention.

<http://www.oecd.org/edu/ceri/dyscalculiaprimerandresourceguide.htm>.⁶
<http://m.sciencemag.org/content/332/6033/1049.short>.⁷
<https://www.understood.org/learning-attention-issues/child-learning-disabilities/dyscalculia/understanding-dyscalculia#item0>.⁸

Dyscalculia is defined in the 2015 ICD-10 under R48.8 as "a wide group of related learning disorders characterised by difficulties with mathematics and manipulating numbers." The ICD-10 also says that cases have been diagnosed across a wide range of IQs. According to the Minister of Education website (gifted.tki.org.nz) under Talented and Gifted-Dyscalculiacs, "students normally have advanced language and other skills, often good visual memory" and recommends strategies for students including exercises which are today called "brain training" are considered best practice for enhancing the neuronal interconnections between lobes of the brain that have, according to neurological evidence involved in this learning difficulty. The website cites research conducted by Dr. Anna Wilson at the University of Oregon and the University of Canterbury, recently publishing with Prof. Karen Waldie, in the areas of cognitive psychology, neuropsychology and dyscalculia.

Conclusion

The efficacy of implementing cross-hemispheric lateralisation exercises to improve some types of SLDs including dyscalculia has been well documented in past research in the clinical, neuro and biopsychology areas, with little implementation into the classroom, but should be championed by Educational Psychologists and Teachers as a way to build confidence and improve career prospects and outcomes for people of all ages.

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

References

1. Molfese DL, Segalowitz SJ. *Brain Lateralization in Children: Developmental Implications*. New York, USA: Guilford Press; 1988.
2. Kershner JR. *Cited in Molfese and Segalowitz*. University of Pittsburgh and Pittsburgh Public Schools research on dyslexia; 1987.
3. Kershner JR. Forced-attention dichotic listening with university students with dyslexia: search for a core deficit. *J Learn Disabil*. 2014;49(3):282–292.
4. Wall JT, Xu J, Wang X. Human brain plasticity: An emerging view of the multiple substrates and mechanisms that cause cortical changes and related sensory dysfunctions after injuries of sensory inputs from the body. *Brain Res Brain Res Rev*. 2002;39(2-3):181–215.
5. Orton S. Reading, writing, and speech problems in children: A presentation of certain types of disorders in the development of the language faculty. *JAMA*. 1937;109(4): 302-303.
6. <http://www.oecd.org/edu/ceeri/dyscalculiaprimerandresourceguide.htm>
7. <http://m.sciencemag.org/content/332/6033/1049.short>.
8. <https://www.understood.org/learning-attention-issues/child-learning-disabilities/dyscalculia/understanding-dyscalculia#item0>Website