Rhyme and rhythm modulation in dyslexia

Carlos A. Mugruza-Vassallo[1], Keith A. Schneider[1]
1. University of Delaware, Newark, Delaware, USA
cmugruza@yahoo.com

ABSTRACT

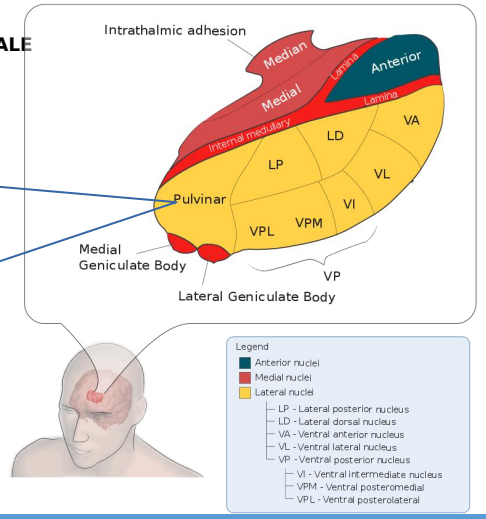
Although the response to "normal circumstances" in the process of auditory rhythm in dyslexia seen mostly in behavioral response but there are some in eye movements, EEG and under MRI. In the present study, first we have reviewed on literature search on “dyslexia” and TMS studies from SCOPUS and PUBMED, second we have used current flicker checkerboard studies to make a proposal experiment. Only one study have used consistently stimulus on dyslexia on 10 participants. Few test methods has been observed to play a critical role in how to identify problems (e.g. Desroches et al , 2006). In particular, the auditory rhythm in children is different in dyslexia, but its sensitivity is controlled with literacy in adults (Thomson et al., 2006) and recently the individual variability to understand in dyslexia increases the chance of perception capacity as a musical key rhythm for phonological and reading acquisition (Boll-Avetisyan et al., 2020). In particular, the study of the temporal and frequency responses of the lateral geniculate nucleus (LGN) and its controller in the thalamic reticular nucleus (TRN), can determine if the temporal responses of these nuclei are normal in dyslexia. Even more, there are few studies pointing to TMS modulating thalamic responses in visual stimulus detection (Hurme et al., 2020).

INTRODUCTION

TMS as therapy have been approved during last decade in UK and USA for some mental disorders such schizophrenia, but not for dyslexia. Indeed, there are not many research on dyslexia therapy employing TMS. Therefore, here literature search results are presented as well as a experimental design in order to understand the dyslexia origins and possible applications of TMS to help in dyslexia treatment.

METHODOLOGY AND RATIONALE

Few test methods has been observed to play a critical role in how to identify problems (e.g. Desroches et al , 2006). Current data analysis in controls by Mugruza-Vassallo and Potter (submitted) have reported Pulvinar activated by modulation of PFC cortex activation under different sound train stimuli



Eligibility and Literature Search terms On SCOPUS and PUBMED:

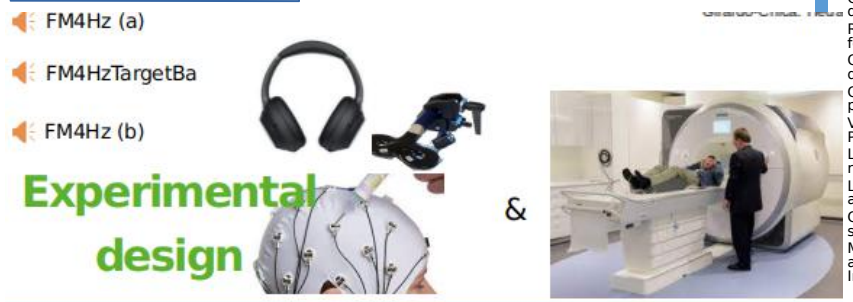
(Dyslexi* OR "reading disorder*" OR "writing disorder*" OR "spelling disorder*" OR "learning disorder*" OR "reading disabilit*" OR "writing disabilit*" OR "spelling disabilit*" OR "reading difficult*" OR "writing difficult*" OR "spelling difficult*" OR "word blindness") AND (TMS)

TMS was not used routinely with other techniques as shown in Table 1. Thi initial exploration found that Constanzo et al. (2013) used 10 Italian participants with dyslexia.

Table 1: Literature search re

Dysl exia	TMS +	Authors	Year
No	sMRI (T1)	Woollamset al.	2017
No	-	Ronconi et al	2014
10	-	Costanzo et al	2013
No	-	Costanzo et al	2012
No	Eye moveme nt	Vernet et al	2011
No	-	Laycock et al.	2009
No	Review	Laycock & Crewther	2008
1	-	Coslett & Monsu	1994

Contanzo’s results showed that 5 Hz-rTMS stimulation over the left IPL improves non-word reading accuracy Vertex (P=.044; d= 0.37) and Baseline (P=0.015; d=0.46) by and hf-rTMS stimulation over the left STG increases word reading speed and text reading accuracy (all P <.01; d = [-1.3 , -3.11]). Moreover, after right IPL stimulation, non-word reading accuracy also improves.



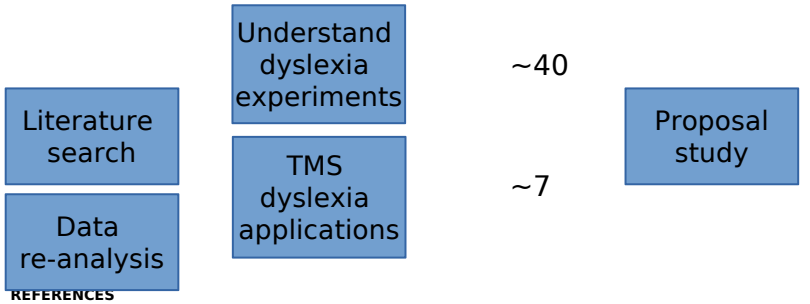
DISCUSSION AND CONCLUSIONS

Identify problems with eye tracker (n=8, Desroches et al , 2006).

Auditory rhythm in children is different in dyslexia, but its sensitivity is controlled with literacy in adults (n=19, Thomson et al., 2006)

Individual variability to understand in dyslexia increases the chance of perception capacity as a musical key rhythm for phonological and reading acquisition (n=23, Boll-Avetisyan et al., 2020).

In particular, the study of the temporal and frequency responses of the lateral geniculate nucleus (LGN) and its controller in the thalamic reticular nucleus (TRN), can determine if the temporal responses of these nuclei are normal in dyslexia. Even more, there are few studies pointing to TMS modulating thalamic responses in visual stimulus detection (Hurme et al., 2020)



REFERENCES

Woollams, A. M., Madrid, G., & Ralph, M. A. L. (2017). Using neurostimulation to understand the impact of pre-morbid individual differences on post-lesion outcomes. Proceedings of the National Academy of Sciences, 114(46), 12279-12284.

Costanzo, F., Menghini, D., Caltagirone, C., Oliveri, M., & Vicari, S. (2013). How to improve reading skills in dyslexics: the effect of high frequency rTMS. Neuropsychologia, 51(14), 2953-2959.

Ronconi, L., Basso, D., Gori, S., & Facoetti, A. (2014). TMS on right frontal eye fields induces an inflexible focus of attention. Cerebral Cortex, 24(2), 396-402.

Costanzo, F., Menghini, D., Caltagirone, C., Oliveri, M., & Vicari, S. (2013). How to improve reading skills in dyslexics: the effect of high frequency rTMS. Neuropsychologia, 51(14), 2953-2959.

Costanzo, F., Menghini, D., Caltagirone, C., Oliveri, M., & Vicari, S. (2012). High frequency rTMS over the left parietal lobule increases non-word reading accuracy. Neuropsychologia, 50(11), 2645-2651.

Vernet, M., Yang, Q., & Kapoula, Z. (2011). Guiding binocular saccades during reading: a TMS study of the PPC. Frontiers in human neuroscience, 5, 14.

Laycock, R., Crewther, D. P., Fitzgerald, P. B., & Crewther, S. G. (2009). TMS disruption of V5/MT+ indicates a role for the dorsal stream in word recognition. Experimental brain research, 197(1), 69-79.

Laycock, R., & Crewther, S. G. (2008). Towards an understanding of the role of the ‘magnocellular advantage’in fluent reading. Neuroscience & Biobehavioral Reviews, 32(8), 1494-1506.

Coslett, H. B., & Monsul, N. (1994). Reading with the right-hemisphere: Evidence from transcranial magnetic stimulation. Brain and language, 46(2), 198-211.

Mugruza-Vassallo, Potter, Tsiora, Macfarlane, Maxwell (submitted) Prior context influences motor brain areas in an auditory oddball task and prefrontal cortex multitasking modelling. Brain Informaticshttps://www.researchsquare.com/article/rs-52248/v1