Considering the music curriculum for dyslexic children in China

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Introduction

This paper aims to investigate the condition of the music curriculum for dyslexic children in China. Based on the Ministry of Education (2022), there are about 105.6 million students who have dyslexia in China. Naturally, there might be many students in need of help with music learning and there should be a specific music curriculum for students who have dyslexia as it is important for music education and society. Firstly, this paper will explain what dyslexia is. Then, the symptoms of dyslexia in music learning and some research programs for helping dyslexic students all over the world will be explored. Subsequently, whether there are appropriate musical curriculums or programs for dyslexic students and the standards of these music curriculums in China will be shown. Finally, according to the basic condition of the Chinese musical curriculum for dyslexic students and other related research in other nations, there will be some implications for the music curriculum for dyslexic in China, which could be conducive to providing further help for dyslexic students to study music. In the field of music, students are required to have an ability to read music, which can be paralleled to having similar ability to recognise words. In this case, there exists a phenomenon that students with dyslexia cannot read music at an average speed and cannot have formal music studying. Therefore, it seems necessary for students with dyslexia to achieve certain help and special guidance when studying music. To some extent, it is also concerning the education of disabled children, which is a significant component of society and any changes in education tend to have impacts on the whole society. However, whether designing a specific music curriculum for students with dyslexia is still a controversial topic.

What is dyslexia?

It could be seen that some students have difficulty in reading and spelling words. Shaywitz et al. (2003) indicated that by third grade, the majority of students have mastered reading to the point where they can read unfamiliar and nonsense words. Nevertheless, for some dyslexic students at that age, it is still challenging for them to read the words. In some cases, people who have difficulties in reading and spelling might be diagnosed as dyslexic. As Shaywitz (1996) considered, dyslexia is a reading disorder that affects children and adults who otherwise have the intelligence, motivation, and education required for correct and fluent reading. In modern society, dyslexia is one of the most common learning disabilities. According to the most recent statistics, dyslexia is quite common, affecting over 20% of the population (Shaywitz et al., 2021). However, this data cannot

be regarded as absolutely accurate because the phenomenon that some people are not willing to share their real conditions can still exist. Additionally, there seems no clear evidence in the paper (Shaywitz et al., 2021) to suggest that the data source is global.

In terms of other influences of dyslexia, dyslexia has significant negative consequences on children's health and socioeconomic status in addition to low academic achievement (Kuhl et al., 2020 and Sanfilippo et al., 2020). It could be found that it is extremely tough for some children to make a speech, read and do other cognitive activities. However, their peers could do these things easily. In this case, children with dyslexia are more possible to be anxious due to lacking confidence in studying the language. Informed by Willcutt & Pennington (2000), due to their academic underachievement, children with dyslexia may become introverted, worried, and unhappy. This point is also supported by Carroll & Iles (2006), who proposed that children with learning difficulties, such as dyslexia, are more likely to experience emotional problems such as anxiety and sadness. Similarly, Svetaz, Ireland & Blumit (2001) found that adolescents with learning difficulties, such as dyslexia, are twice as likely to experience mental distress, which can lead to aggression and suicide attempts. It has been suggested that dyslexia is caused by a problem with the processing of phonemes, which are the linguistic components that make up all spoken and written text (Shaywitz, 1996).

Furthermore, Lyon (1997) pointed out that the majority of children are not diagnosed with a reading problem until they are in third grade, or around nine years old. Also, once people have been diagnosed as dyslexic, there is no need for them to examine again because this disability is persistent. In addition, there is a stereotype that reading impairments in boys are identified more frequently than in girls. In contrast, informed by Flynn (1994), the rate of girls and boys having dyslexia is almost the same. Hence, it is reasonable to observe every child's reaction and behaviour when they learn to read and spell.

Dyslexia in music

Although there are limited references in the literature regarding dyslexic musicians' difficulties with institutionalised music study, particularly reading music, it is undeniable that people having dyslexia also tend to have difficulties in studying music because note reading might be a challenging task for dyslexic learners. For example, reading notes is an issue for Oldfield (1987), a dyslexic flautist. She says it might be "a whole lot of birds sitting on telegraph wires" (rather than notes on a stave). Furthermore, Mile (1993) mentioned a dyslexic pianist who admitted, "I read it [music] slowly. I'm less ahead than most people would be for the amount of learning I've done. My sight reading is a bad point; I know it all but it's slow. Then eventually my fingers remember" (p. 145). Indeed, reading music notation is a difficult activity that necessitates the integration of a variety of perceptual, cognitive, and motor processes. However, the research showed that in their capacity to learn to read and play these particular music symbols, kids with reading impairments were no different from age-matched nonreading impaired peers or reading-level matched peers (Benson, Lovett & Kroeber, 1997). This is due to the fact that reading musical notation does not require learners to have phonological skills of segmenting and blending which is significant for

language studying. For this reason, it appears to be unnecessary for music educators to worry about dyslexic people's capacity for reading notation. Instead, music educators should pay more attention to other aspects of music where dyslexic people may feel frustrated and then adjust teaching methods and curriculum to help them according to their weaknesses.

Firstly, people with dyslexia might struggle with measuring timing, especially for accurate or rapid timing. To discriminate between a variety of musical skills and sub-skills, a series of Musical Aptitude Tests (MATs) was created specifically for dyslexic youngsters. The MATs were administered to 15 dyslexic children (ages 7–11, mean age 9.0) and 11 control children (ages 7–10, mean age 8.9), and the results were compared. Based on the study MATs (a collection of musical aptitude tests) conducted by Overy et al. (2001), the results indicated that the dyslexic group outperformed the control group on three measures of pitch abilities (perhaps due to slightly more musical experience), but they outperformed the control group on seven out of nine tests of timing skills. Specifically, the most obvious difficulty for people with dyslexia is regarding rapid temporal processing. In the field of music, it appears that dyslexic people will meet many obstacles due to their weakness in timing skills. Indicated by Ganschow, Lioyd-Jones & Miles (1994), people with dyslexia tend to feel stuck with rhythm. Specifically, problems with keeping a constant speed and imitating rhythm patterns were proposed by Olgethorpe (1996) and Atterbury (1983) respectively.

To deal with this struggle, some researchers proposed a few suggestions. For instance, Blythe (1998) indicated that it might be effective to sing at a slow speed and emphasise speech sounds. In addition, in America, there were three approaches designed for dyslexics to alleviate this struggle. One of the approaches was to concentrate on group singing and highlighting rhythmic and melodic comprehension (Hurwitz et al., 1975). Furthermore, West & Holdstock (1985) contended there are some games from basic level to an advanced level designed for dyslexic children to enhance their rhythmic and timing skills in particular.

Moreover, reading written music is also another challenge for dyslexics but it plays a significant role in studying music, which could influence students' ability to learn a new piece independently. Music reading is a complicated sub-skill of musical performance that is learnt by explicit coaching (Hébert & Cuddy, 2006) and might be typically the first step in instrumental music education in some cases (Gudmundsdottir, 2010). The reasons why dyslexics have difficulties reading written music are said to be of many reasons. One of them is that the general concepts of written music can be tough for pupils to automate. To put it simply, the intuitive perception of musical notation may not always match the notation's true meaning (Tan, Wakefield & Jeffries, 2008). In addition, compared with text reading proceeding sequentially, music reading requires both vertical (pitch) and sequential reading (Hébert & Cuddy, 2006). For this reason, it could be observed that music reading has a high requirement for reading ability. Naturally, there is a strong possibility that dyslexics will feel struggled with reading written music.

To address the problem, suggestions for adapting the design of written music for dyslexic students have been proposed by some researchers. Solis (2012) who is a researcher in special and music education, found that some students with dyslexia struggled to read black text on white paper and discovered that printing text on coloured paper or using coloured overlays alleviated some of the

tiredness caused by reading most common printed texts. Based on the methodology of this study, it could be noticed that all of the participants were asked to play from three music examples including one repeated and two new examples printed in different colours according to their preferences. In this case, the repeated performance could have a slight impact on participant feelings and final results, although the repeated example was balanced with two new examples. However, these influences are in the normal range so the finding of this research is that printing texts on coloured paper still can be regarded as an effective teaching method to help the students with reading texts. Likewise, Macmillan (2005) said that Hubicki created the Coloured Staff programme to encourage the identification of visual patterns through colour. Based on the further explanation by Hubicki (2001), he suggested that it might be viable to assign a colour to each pitch. In detail, Hubuki (2001) stated that "One of the Colour-Staff's basic aims is to fix the symbols in the learner's imagination" (p. 86). To some extent, using a variety of colours to mark pitch and texts could lower the reading difficulties for dyslexic students, which could be considered a way to help students with dyslexia to read music. Although there is no reference to propose many colours might distract readers attention, this possibility still exists.

Apart from applying colour to decorate the written music, there is another method to enhance the dyslexics' reading speed. The effects of expanding text on children with dyslexia were studied by O'Brien, Mansfield, and Legge (2005). There was a key font size for both dyslexic and non-dyslexic readers. It could be found that the reading speed drastically declined below this size. Also, except for a critical font size, O'Brien et al. (2005) discovered an ideal font size. When compared to normal learners at the same level of reading ability, dyslexic kids required 32 per cent larger fonts to reach their maximal reading speed. Thus, adjusting the size of the text seems to have a good effect on dyslexic students' reading.

It seems that music could help dyslexic students to study language and literacy. Based on Jorm et al.'s study (1986), people with dyslexia might have problems with short-term memory. Furthermore, Tallal et al. (1993) proposed that for dyslexics, the magnocellular pathways in the brain (which are assumed to be important for quick sensory processing) are neurologically faulty, resulting in rapid temporal processing issues that influence different elements of sensory perception. It has been indicated by Tallal et al. (1996) that some training can help people enhance their temporal processing ability, which will help improve people's language and literacy skills. Considering the characteristics of music, some musical activities could stimulate and strengthen learners' potential ability in this aspect. For instance, activities such as choir, reading notes and so on all require timing skills. Music training, which necessitates extremely precise timing abilities, might serve as a vehicle for the development and enhancement of temporal processing ability, and so could be a useful type of supplementary remediation for dyslexic youngsters (Overy, 2000).

More specifically, musical training such as maintaining a steady beat is a usual and good method. As Thomson (1993) said, dyslexics' spelling skills can be improved by tapping out the number of syllables in a word to a steady beat. Additionally, the study (Hurwitz et al., 1975) discovered that in their first year of school, 20 students who had received Kodaly music training (which is focused on singing and emphasises rhythm abilities) scored much higher on reading tests than those who had

not had music training. In this case, it is necessary for schools to emphasise musical activities, which not only can cultivate students' interest in music but also a way to enhance students' reading ability, especially for dyslexic students.

Conditions of music curriculum for dyslexic students in China

Based on a survey in 2020, there have been 105.6 million people with dyslexia in China (Ministry of Education, 2020). Under this circumstance, it is crucial to organize some specific programmes to help these people. In Hong Kong, the Hong Kong Specific Learning Difficulties Behaviour Checklist (For Primary School Pupils) indicated that additional professional assessment for learning disabilities is required, and school instructors should refer poor academic achievers to professional psychologists for examination (Ho, Chan, Tsang, & Lee, 2000). The Hong Kong Specific Learning Difficulties Behaviour Checklist, developed by the Education Bureau of the Hong Kong Special Administrative Region, urges schools to detect students with dyslexia as early as grade one (Ho et al., 2000). However, there still exists that some children with dyslexia could not be identified after they are above grade one. Based on the information from the Education Bureau (2007) (formerly the Hong Kong Education Department), as far as teachers aid and guidance for dyslexics are concerned, before 2007, there was no policy about teaching training for teachers with regards to offering special support and help for dyslexic students and so there was no professional curriculum for them.

Since September 2007, Hong Kong's Education Bureau has developed a five-year teacher professional development framework to provide three-tiered teacher training in helping children with special educational needs (Education Bureau, 2007). With this in mind, only a small percentage of instructors (10%) were expected to finish the Basic Course in the five years after the 2007–2008 school year (Education Bureau, 2007). Up until now, this trend is still continuous. The conditions of the music curriculum for dyslexics are similar. Even worse, there might be no specific policy for music curriculum designed for dyslexic students. In this case, dyslexic students cannot have music education of high quality.

In Mainland China, there is a comparable situation of musical curriculum for students with dyslexia. Although there has been a large number of people with learning disabilities, it seems that special education still does not have enough attention. Wang & Mu (2014) pointed out that one of the most essential variables in the growth of special education in China is that teacher quality has been identified as a significant factor, which could have a great impact on education for dyslexics. With lack of professional skills, a lack of training opportunities, and a lack of funds are common issues throughout China, particularly in less developed regions (Lai, Li, Ji, Wong & Lo, 2016; Lu, Hao, Chen, & Potmesil, 2018). Similarly, in terms of music education, there are no specific music curriculums and teaching methods for dyslexics. Based on the present conditions of the music curriculum in China, it is very important to design an appropriate musical curriculum for students with dyslexia.

Implications

According to the basic condition of the music curriculum for dyslexics in China and some related research, some implications will be provided. Firstly, music educators need to know what dyslexia is and then they could know how to aid people with dyslexia effectively. As the National Institute of Child Health and Human Development (2000) considered, to provide students with aid, teachers are required to master a detailed and accurate knowledge about dyslexia. For this reason, it is important for music educators in China to study the basic knowledge about dyslexia. Meanwhile, the education department should organise related free courses and encourage teachers to attend, which is the foundation of special education. Specifically, these courses could be organised at the college for special education on the weekend and funding for these courses can be provided by Chinese Association for Special Education. In addition, students who specialise in special education can be invited to be volunteers to transfer related knowledge about dyslexia to the music educators, which also can be regarded as students' social practice. Under this circumstance, the cost of these training courses is relatively low, meanwhile, these students can master related skills and knowledge more expertly.

Secondly, according to some research about dyslexia in other countries, it might be necessary to add some special guidance in music courses for students with dyslexia. For instance, due to dyslexic students' weakness in measuring time, accurate and rapid timing, in particular, music educators could let dyslexic students sing at a slow speed and pay more attention to speech sounds. Nevertheless, it might be challenging for music educators to implement these activities in a normal school where the majority of students are without dyslexia. For example, music educators cannot choose an appropriate speed both appropriate for dyslexics and healthy students. Under this circumstance, it seems that choosing pieces slower not only could satisfy the special demands of dyslexic children but also will not influence the studying effect of the majority of students. However, it is not a method which can be used for a long time. Moreover, music educators could divide students into different groups and every group sing at a different speed. In this case, dyslexics can be arranged to the group at a slow speed and students with dyslexia will not receive strange looks from others. Although music educators could give a certain help for dyslexic students, the help is limited. In this way, designing a music curriculum for students with dyslexia is a good choice.

Furthermore, encouraging students to sing in a group and emphasising rhythmic and melodic comprehension is another teaching method to guide dyslexics to study music. Furthermore, some designed games such as choir and counting the beats could be carried out in the class. In this case, it could be noticed that the focus of the music curriculum and teaching methods for students with dyslexia is different from the mainstream music curriculum. For dyslexic students, when teaching dyslexics to read written music, it is better to use colourful texts and use an ideal font size. Thus, there is a special demand for teaching materials, which is the indispensable component of the music curriculum for dyslexics.

In addition, the special musical training for dyslexics also can be thought of as an aid for language learning. As Overy (2000) said, music training, which necessitates extremely precise timing

abilities, might serve as a vehicle for the development and enhancement of temporal processing ability, and so could be a useful type of supplementary remediation for dyslexic youngsters. In this case, the special musical curriculum for students with dyslexia is necessary because it will include specific training and focus, compared with the formal music curriculum. For example, activities such as maintaining a steady beat could be involved in the curriculum because it is a method to help people to improve their temporal processing ability.

In short, due to the relatively bad condition of musical education for dyslexics in China, it is important for music educators and the education department to design a special and appropriate curriculum for them. In light of some studies in other countries, they should choose appropriate teaching materials with colourful texts and ideal size. Additionally, music educators should change the focus during teaching including highlighting the rhythmic and melodic understanding instead of the effect of their performances. Moreover, when designing the music curriculum for dyslexic students, educators should consider more about some activities such as keeping a steady beat because it is also conducive to their reading ability to some extent. Last but not the least, it is significant to take dyslexics' abilities and weaknesses into consideration when designing the music curriculum, which could contribute to strengthening students' confidence and benefit the good effect of the curriculum. Choosing the songs at slow speed is a good example because of dyslexics' weakness in rapid timing. Nevertheless, designing a special curriculum for dyslexics is still a controversial problem for the whole society.

Conclusions

In conclusion, this paper draws upon the condition of the music curriculum for dyslexics in China and provides some suggestions in light of the related study from other countries. Firstly, this paper explains that dyslexia is a reading disorder caused by a problem with the processing of phonemes. Secondly, there is a large number of studies on dyslexia are shown. For instance, it pointed out that dyslexics might struggle with measuring timing and rhythm. In addition, reading written music is also challenging for dyslexics. To solve these problems, some programs and suggestions have been shown by scholars such as O'Brien et al. (2005), who discovered there is an ideal font size for dyslexics. Solis (2012) found using colourful print texts is beneficial for dyslexics' studying. In China, there might be no concrete music curriculum for dyslexics until now. Combined with the present situation of music curriculum for dyslexics, it is a good choice to consider these methods when designing a dyslexic music curriculum.

Nevertheless, designing a special curriculum for dyslexic students is a controversial problem. Some people guess it is not equal for the students who are involved in mainstream education. In my humble opinion, it is necessary to design a specific music curriculum for students with dyslexia. The reason is that courses aim to help students to master related abilities and knowledge. Curriculum design should be depended on students' ability, otherwise the teaching effect could not be ideal. Under this circumstance, it shows equality for dyslexic students and other students because what the government do is to provide appropriate education and guidance for students according to what students really need. From another aspect, disabled people are a special group in society.

Naturally, a specific curriculum for them should be understood. If dyslexic students attend mainstream education, there is a strong possibility that they will feel frustrated and anxious, which is not conducive to their studying. Therefore, I consider it is extremely necessary for the Chinese government to pay more attention to dyslexics' music education, cultivate professional music educators and design an appropriate music curriculum for them.

References

Atterbury, B. W. (1983). A Comparison of Rhythm Pattern Perception and Performance in Normal and Learning-Disabled Readers, Age Seven and Eight. *Journal of Research in Music Education*, *31*(4), 259–270. https://doi.org/10.2307/3344629

Benson, N. J., Lovett, M. W., & Kroeber, C. L. (1997). Training and transfer-of-learning effects in disabled and normal readers: Evidence of specific deficits. *Journal of Experimental Child Psychology*, *64*, 343–366.

Blythe, S. (1998). Music Matters. *Music Educators*, 43.

Carroll, J. M., & Iles, J. E. (2006). An assessment of anxiety levels in dyslexic students in higher education. *British Journal of Educational Psychology*, *76*(3), 651–662. https://doi.org/10.1348/000709905x66233

Critchley, M. (1970). *The dyslexic child*. William Heinemann Medical Books Limited.

Education Bureau. (2007). *Teacher professional development framework on integrated education.* Retrieved from http://www.edb.gov.hk/index. aspx?nodeID=6567&langno=1

Flynn, J. M., & Rahbar, M. H. (1994). Prevalence of reading failure in boys compared with girls. *Psychology in the Schools*, *31*(1), 66–71. https://doi.org/10.1002/1520-6807(199401)31:1<66::aid-pits2310310109>3.0.co;2-j

Ganschow, L., Lloyd-Jones, J., & Miles, T. R. (1994). Dyslexia and musical notation. *Annals of Dyslexia*, *44*(1), 185–202. https://doi.org/10.1007/bf02648161

Hébert, S., & Cuddy, L. L. (2006). Music reading deficiencies and the brain. *Advances in Cognitive Psychology*, *2*, 199–206.

Ho, C. S.-H., Chan, D. W., Tsang, S., & Lee, S. (2000). *The Hong Kong specific learning difficulties behaviour checklist (for primary school pupils)*. Hong Kong: Hong Kong Specific Learning Difficulties Research Team.

Hubicki, M. (2001). A multisensory approach to the teaching of musical notation. *Music and Dyslexia: Opening New Doors*, 85–100.

Hubicki, M., & Miles, T. R. (1991). Musical notation and multisensory learning. *Child Language Teaching and Therapy*, *7*(1), 61–78. https://doi.org/10.1177/026565909100700104

Hurwitz, I., Wolff, P. H., Bortnick, B. D., & Kokas, K. (1975). Nonmusicol Effects of the Kodaly Music Curriculum in Primary Grade Children. *Journal of Learning Disabilities*, *8*(3), 45–52. https://doi.org/10.1177/002221947500800310

Jorm, A. F., Share, D. L., Maclean, R., & Matthews, R. (1986). Cognitive factors at school entry predictive of specific reading retardation and general reading backwardness: a research note. *Journal of Child Psychology and Psychiatry*, *27*(1), 45–54. https://doi.org/10.1111/j.1469-7610.1986.tb00620.x

Kuhl, U., Neef, N. E., Kraft, I., Schaadt, G., Dörr, L., Brauer, J., Czepezauer, I., Müller, B., Wilcke, A., Kirsten, H., Emmrich, F., Boltze, J., Friederici, A. D., & Skeide, M. A. (2020). The emergence of dyslexia in the developing brain. *NeuroImage*, *211*, 116633. https://doi.org/10.1016/j.neuroimage.2020.116633

Lai, F. T. T., Li, E. P. Y., Ji, M., Wong, W. W. K., & Lo, S. K. (2016). What are the inclusive teaching tasks that require the highest self-efficacy? *Teaching and Teacher Education*, *59*, 338–346. https://doi.org/10.1016/j.tate.2016.07.006

Lu, M., Hao, L., Chen, X., & Miloň, P. (2018). Teacher Efficacy, Work Engagement, and Social Support Among Chinese Special Education School Teachers. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00648

Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. A. (2003). A definition of dyslexia. *Annals of Dyslexia*, *53*(1), 1–14. https://doi.org/10.1007/s11881-003-0001-9

Lyon, G., Alexander, D., & Yaffee, S. (1997). Progress and promise in research in learning disabilities. *Learn Disabil*, *8*, 1–6.

MacMillan, J. (2005). Music and dyslexia – and how Suzuki helps. *European Suzuki Association WebJournal*.

Miles, T. R. (1993). *Dyslexia: The Pattern of Difficulties.* (2nd Ed). London: Whurr Publishers.

National Institute of Child Health and Human Development. (2000). Report of the National Reading Panel. *Teaching Children to Read: An Evidence-Based AssessMent of the Scientifi c Research Literature on Reading and Its Implications for Reading Instruction, NIH Publication No. 00–4769*.

O'Brien, B. A., Mansfield, J. S., & Legge, G. E. (2005). The effect of print size on reading speed in dyslexia. *Journal of Research in Reading*, *28*, 332–349.

Oglethorpe, S. (1996). *Instrumental music for dyslexics : a teaching handbook*. Whurr Publishers.

Overy, K. (2000). Dyslexia, Temporal Processing and Music: The Potential of Music as an Early Learning Aid for Dyslexic Children. *Psychology of Music*, *28*(2), 218–229. https://doi.org/10.1177/0305735600282010

Rut Gudmundsdottir, H. (2010). Pitch error analysis of young piano students' music reading performances. *International Journal of Music Education*, *28*(1), 61–70. https://doi.org/10.1177/0255761409351342

Shaywitz, S. E. (1996). Dyslexia. *Scientific American, a Division of Nature American*, *275*(5), 98–104.

Shaywitz, S. E., Shaywitz, J. E., & Shaywitz, B. A. (2021). Dyslexia in the 21st century. *Current Opinion in Psychiatry, Publish Ahead of Print*(34), 80–86. https://doi.org/10.1097/yco.0000000000000670

Solis, M. (2012). *The effects of colored paper on musical notation reading on music students with dyslexia*. Masters thesis. Texas Tech University.

Svetaz, M. V., Ireland, M., & Blum, R. (2001). Adolescents with learning disabilities: risk and protective factors associated with emotional well-being: findings from the National Longitudinal Study of Adolescent Health. *Journal of Adolescent Health*, *27*(5), 340–348. https://doi.org/10.1016/s1054-139x(00)00170-1

Tallal, P., Miller, S. L., Bedi, G., Byma, G., Wang, X., Nagarajan, S. S., Schreiner, C., Jenkins, W. M., & Merzenich, M. M. (1996). Language Comprehension in Language-Learning Impaired Children Improved with Acoustically Modified Speech. *Science*, *271*(5245), 81–84. https://doi.org/10.1126/science.271.5245.81

Tallal, P., Miller, S., & Fitch, R. H. (1993). Neurobiological Basis of Speech: A Case for the Preeminence of Temporal Processing. *Annals of the New York Academy of Sciences*, *682*(1 Temporal Info), 27–47. https://doi.org/10.1111/j.1749-6632.1993.tb22957.x

Tan, S. L., Wakefield, E. M., & Jeffries, P. W. (2009). Musically untrained college students' interpretations of musical notation: Sound, silence, loudness, duration, and temporal order. *Psychology of Music*, *37*, 5–24.

Thomson, M. E. (1993). Teaching the dyslexic child: some evaluation studies. *Meeting Points in Dyslexia*.

Wang, Y., & Mu, G. (2014). Revisiting the trajectories of special teacher education in China through policy and practice. *International Journal of Disability Development and Education.*, *61*(4), 346–361. https://doi.org/https://doi.org/10.1080/1034912X.2014. 955792

West, & Holdstock. (1985). *Earwiggo Again: Rhythm Games.* Yorkshire and Humberside Asociation for Music in Special Education.

Willcutt, E. G., & Pennington, B. F. (2000). Psychiatric Comorbidity in Children and Adolescents with Reading Disability. *Journal of Child Psychology and Psychiatry*, *41*(8), 1039–1048. https://doi.org/10.1111/1469-7610.00691