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## A theoretical and clinical account of music and aphasia

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For many researchers and clinicians working in the field of aphasia, as well as for those in music, the first thought that springs to mind on the topic of “Music and Aphasia” is the clinical use of music for aphasia rehabilitation after stroke, particularly Melodic Intonation Therapy (MIT). Indeed, MIT is the most well-known music intervention for aphasia and a popular topic, both in the general media and amongst researchers, with an increasing number of research teams attempting to provide evidence regarding MIT efficacy and mechanisms. However, as evident in this special issue, the topic of “Music and Aphasia” is much broader than MIT and includes theoretical presumptions and clinical implications that extend far beyond a single therapeutic approach.

The relationship between music and language has been debated in the literature for decades, with some prominent theories focusing on similarities and transfer between music and language and potential shared processing (for e.g., Patel, 2003, 2008, 2014) and others focusing on domain specificity and dissociations between music and language (Peretz, 2009; Peretz & Coltheart, 2003; Peretz, Vuvan, Lagrois, & Armony, 2015). Within the aphasia rehabilitation literature, this has promoted a degree of ambiguity, such that both the shared processing and the dissociations between music and language have been touted as reasons to use music in aphasia rehabilitation. For example, it has been suggested that intact singing in individuals with non-fluent aphasia provides an indirect route or a scaffold for expressive language function, using mechanisms such as music’s right-hemisphere dominance or rhythm (for further discussion, see Merrett, Peretz, & Wilson, 2014; Schlaug, Marchina, & Norton, 2008; Zumbansen, Peretz, & Hébert, 2014). However, it has yet to be fully explained how cognitive systems for music and language that are dissociable in the face of brain injury or congenital abnormalities could at the same time be sufficiently linked to enable music networks to support language function. Regardless of the position taken in these debates, it is clear that further research is needed to clarify the links between music and language and their role in understanding aphasia and music-based aphasia therapies.

Beyond the overarching theoretical relationship between music and language, the existence of associations between music and specific speech and language impairments has been identified in papers in this special issue. For instance, Belfi, Kasdan, and Tranel (in press) investigated the relationship between anomia and music by comparing lexical retrieval deficits for musical melodies and instruments and their neuroanatomic

correlates. Their findings suggest that naming of musical entities (both melodies and instruments) tends to be more impaired/difficult than other categories of items, perhaps due to age of acquisition, and that naming of melodies and instruments both rely on distributed networks that include the left temporal pole. Interestingly, musical instrument naming was dependent on a broader network that includes sensorimotor regions and appears to be distinct when compared to naming of other non-unique, non-living items. Another paper in this issue by Zumbansen and Tremblay (*in press*) focused on the relationship between music and motor-speech impairments. Using a retrospective case-control analysis of numerous studies, they showed that the presence of a motor-speech disorder such as apraxia of speech significantly predicted whether participants would show improvement in speech and language outcomes when treated with singing interventions for aphasia. They propose that the impact of music interventions on non-fluent aphasia may be primarily through amelioration of the motor aspects of speech.

Studies such as these that focus on the links between specific speech and language impairments and music are significant, not only due to their clinical utility but also because they contribute to our understanding of how music and language are intertwined in the brain. For the same clinical and theoretical reasons, studies that investigate how individual components of music are linked to speech and language can also be of benefit. Kershenbaum, Nicholas, Hunsaker, and Zipse (*in press*) have contributed to the ongoing debate regarding the role of specific musical features, i.e., melody and rhythm, in the efficacy of music interventions for aphasia, as well as investigating the role of synchronous productions, i.e., unison versus solo speech and singing. In line with previous findings (Racette, Bard, & Peretz, 2006), they noted a facilitating effect of unison over solo production, but, in contrast to Racette et al., they found that rhythmic speaking generally led to better repetition of unfamiliar material than singing. Although this study cannot speak to the efficacy of using melody in a training context, it does provide additional evidence (see Stahl, Kotz, Henseler, Turner, & Geyer, 2011) that the rhythmic aspects of singing may be the primary promoters of speech accuracy in persons with aphasia.

Switching clinical contexts from aphasia syndromes with a sudden onset to a case study of the use of music in dementia, Baird and Thompson (*in press*) discuss the potential for music to compensate for lost communicative function, its relevance in treating delusional symptoms in dementia, and how music and language were differentially affected throughout the course of the disease, with relative preservation of receptive and expressive music functions. This case provides clear evidence of a dissociation between music and language functions within a framework of overall cognitive decline, and also suggests that there may be a therapeutic role for music even in progressive aphasia syndromes.

Finally, Merrett, Tailby, Jackson, and Wilson (*in press*) provide a perspective on the challenges associated with providing an evidence base for the use of music in aphasia rehabilitation. Using case study examples from an MIT pilot study, they propose that standardised research designs used in methodologically rigorous investigations often fail to reflect the flexible procedures that are clinically necessary to optimise therapies in the face of individual differences, and they offer suggestions to increase the relevance of research regarding treatment efficacy and mechanisms in this context.

In just these few papers, the broad scope of the topic “music and aphasia” can be glimpsed, with studies spanning different clinical and research domains and probing discrete aspects of music, speech and language, and their interrelationship. Although MIT may continue to be

one of the best-known and most well-supported music-based therapies for aphasia (Zumbansen & Tremblay, *in press*), it is hoped that this special issue will inspire new theoretical and clinical research across a wide array of themes relevant to music in aphasia.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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