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Neurobiological Aspects of Music Therapy

Thomas Stegemann, MD¹

Notes From an Old Town in a Small Country . . .

Sitting in the Café Schwarzenberg, which is located at the Ringstrasse, from where one can view the rear side of the famous concert hall “Musikverein” as well as the Asian-appearing, minaret-like turrets of the Karlskirche, a black-suited waiter wearing a bow tie is serving a “kleiner Brauner” (an espresso with milk) together with a glass of water on a silver tray, while a “Fiaker” (horse and carriage) is slowly passing by. A hundred years ago, Freud, Schnitzler, Klimt, or Schönberg might have used the same phrases to describe the typical ambience of a Viennese coffee house visit—of course, they may have used words more eloquently than I have. And, of course, since 1913, times have changed in Vienna. Today, the scene described above is “updated” by an electric city bus that stops at the crossroads and the sound of smartphone ringtones from the next table and a “McCafé” vis-à-vis that attracts more tourists than the old “Kaffeehaus.”

The year 1913 was a special year in many aspects. It was to be a turning point in politics, in medicine, in music, in arts It was the year before the outbreak of World War I (WWI), later labeled “the great seminal catastrophe of this century.”¹ This war was to dramatically change the ways of fighting a war. Because of technological developments and the use of weapons of mass destruction for the first time in human history, more than 9 million combatants were killed. The catalyst of WWI was the assassination of Archduke Franz Ferdinand of Austria in Sarajevo in 1914. The world would not look the same after this year, and many roads—not all—lead to Vienna.

The “fin de siècle,” between 1890 and 1914, was characterized by social turmoil amid the rise and fall of a new era, and both diffused anxiety and euphoria in the face of an uncertain future as the foreboding of WWI darkened the horizon. It is no coincidence that Sigmund Freud dated the publication of his seminal work “Die Traumdeutung” (“The Interpretation of Dreams”) to the year 1900; the discovery of the unconscious is almost like a seismograph of the Zeitgeist, as groundbreaking insights into psychology were literally absorbed by the artists all over Europe. Hegi-Portmann et al^{2(p11)} summarized, “Everywhere, there is a break with constricting traditions and moral concepts: creativity, instinct, and feelings are increasingly recognized and valued in contrast to the mechanical, intellectual, and rationalism—this becomes manifest in a (re)discovery of an awareness for the human body” (translation by T.S.). The dissolution of traditional forms—an answer to the upper-class decadence and the national-oriented militarism of the time—is

mirrored in all forms of arts. In music, the protagonists of the second Viennese School (Schönberg, Berg, and Webern) initiate the “emancipation of dissonance” and the dawn of tonality: endeavoring to find a new tone language, they strive for a new understanding of the arts. The influence of Freud becomes obvious in a letter to Wassily Kandinsky by Arnold Schönberg, “Art belongs to the unconscious! One must express oneself! Express oneself directly! Not one’s taste, or one’s upbringing, or one’s intelligence, knowledge or skill.”^{3(p53)}

Literally eye-catching, one sees an evolution of distinct changes in the visual arts: Expressionism commits itself to an emphasis on inner expression, beginning with a disengagement from color and form as hitherto familiar in figurative art. Eventually, these developments led from cubism (Picasso and Braque) to abstract art.

Crucial for the development of the arts therapies, in particular for dance therapy, are—beside the revolutions in arts and psychology—the influences of the “Reform Movement.” Ignited by a fundamental critique of industrialization with its far-reaching consequences, the Reform Movement began developing around the mid-19th century. Originated primarily in Switzerland and Germany, its heterogeneous roots were unified in the quest for a return to a “natural life” (nutrition, clothing, movement, naturopathy, etc). As Fitzthum^{4(p21)} summarizes, “The human body was always in the centre of this reform movement (. . .). Its symbolical liberation provide the basis for a new attitude towards life. The reformers were united in abandoning stagnant, outdated ways of life, no matter if they were searching for new art forms, breaking with traditional concepts of relationships, or yearning for a new quality of being” (translation by T.S.).

In summary, it can be stated that the arts therapies developed in the tradition of the “fin de siècle” facilitated a new understanding of humankind as an individual and creative being. New and novel insights from the arts, philosophy, and psychology fundamentally changed the understanding of body (eg, sexuality) and mind (eg, unconsciousness); thus, these developments paved the way for new forms of education (“Reformpädagogik”), which was to be of great importance for the development of music, dance, and art therapy as well.

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In addition to the sociocultural developments, it seems worthwhile to take a look at the changes in neurosciences within the past hundred years. In 1913, the year he published “Totem and Taboo,” Freud—at the time, as a renowned professor in Vienna—had already abandoned his primary goal of formulating a biological model of the mind for some years. Freud, who had started his medical career in neurophysiology, realized quite early on that the time had not yet come to empirically prove his neural model of mind. Kandel^{5(p58)} argues, “A second, more important reason why Freud abandoned his biological model was his conviction that the effort to link three different levels of analysis—behavior, mind, and brain—was premature. Having carried out research at the frontiers of brain science, he was aware that too little was known about the inner workings of the brain for him to make serious efforts to cross, in one step, two huge divides in knowledge: that between clinical behavior and mind, and that between mind and the brain.” Likewise in the year 1913, with Paul MacLean, a man was born, who would carry on some of Freud’s ideas by developing the concept of the “limbic system,” which in current times serves as a model for our understanding of emotion and the function of the unconscious.

So today, in the year 2013—100 years later—the time seems ripe to transfer the fundamental knowledge of brain research, which has been gaining increasing attention, especially during the past 3 decades (thanks to neuroimaging methods), and other advancements in neurosciences, to clinical application. To foster this, US President Barack Obama launched a US\$100 million project to facilitate brain research with the aim of helping researchers to find “new ways to treat, cure, and even prevent brain disorders, such as Alzheimer’s disease, epilepsy, and traumatic brain injury.”⁶ According to Obama, these efforts can only be compared with the Space Race, representing the “Grand Challenges of the 21st century.”⁶

Henk Smeijsters,⁷ a Dutch music therapist, has proposed 4 categories that reflect both the main chronological and the central philosophical developments in music therapy: a magical paradigm (music heals through supernatural power), a mathematical paradigm (the healing effects of music can be explained through analogies between numerical ratios in space and frequency ratios in music), a medical paradigm (music functions like a drug; physiological effects can be proved empirically), and a psychological paradigm (the impact of music on the human body and mind can be explained through psychological mechanisms). With respect to the recent developments, it appears reasonable to propose a neurobiological paradigm in music therapy as a complementary concept to the former. This special issue on neurobiological aspects in music therapy constitutes one more brick in a framework that aims to help explain the salutogenetic effects of music.

In this issue, neuroscientific fundamentals are covered by Stefan Koelsch who presents his music–psychological concept of the 7 Cs, emphasizing the role of social aspects in making music. The contribution by Eckart Altenmüller and Gottfried Schlaug bridges the gap from basic research in neuroscience to neurologic music therapy, stressing the importance of multimodal networks in the brain. The article by Jörg Fachner and Thomas Stegemann offers an introduction into electrophysiological

methods in music therapy research, in particular the use of electroencephalography (EEG). Clinical applications, featuring different music therapeutic approaches, are highlighted in 4 articles that offer an excellent state-of-the-art overview of disorders that are among the diseases that are explicitly addressed in the BRAIN initiative.⁶ Marianna Boso, Egidio D’Angelo, and Francesco Barale offer explanations as to why music affects children with autism on a neurobiological basis. The article by A. Blythe LaGasse and Michael Thaut deals with the different approaches of neurologic music therapy (NMT) in the treatment of persons with stroke, Parkinson disease, multiple sclerosis, and other neurological conditions. The contribution by Concetta Tomaino gives an historical overview, spanning 3 decades of thorough research, leading to a clinical-based music therapy concept that meets the complex needs of individuals with Alzheimer disease and other dementias. Finally, the effect of Mozart’s and other classical music on brain activity in children with epilepsy is documented in the article by Lung-Chang Lin and Rei-Cheng Yang—with Mozart taking us back to Vienna again.

Closing the circle, in current times, I may add that in 2010, the first inaugural International Association for Music & Medicine (IAMM) conference was hosted in Krems, Austria. Upcoming international events will provide a good opportunity to learn more about Austria and music therapy: the World Congress of Music Therapy 2014 in Vienna and Krems, and the 10th European Music Therapy Conference 2016 in Vienna. We will have a “kleiner Brauner” in a traditional Viennese coffeehouse and continue the debate about the effects of music on body and brain in the long tradition of Freud, Schönberg, et al.

Please join our IAMM community for our next conference, themed “Music Medicine Through the Lifespan,” which will be held on June 24–27 at the University of Toronto. The host committee and IAMM are planning several plenary sessions on “Music and the Neurosciences.”

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