

Topics: COLLOQUIUM

Category: ARTS/MEDICINE/NATURAL SCIENCES/INTERDISCIPLINARY

Music therapy: scientific perspectives and clinical prospects

Wolfgang Mastnak

Professor of Music Education and Music Therapy, Shanghai Conservatory of Music, member of the research group “Aesthetics in Music Education”

ABSTRACT

Music and arts for healing purposes look back over a multifaceted evolution and a myriad of phenomena in various cultures. Interdisciplinary considerations suggest to distinguish five different, but partly overlapping stages. The first refers to historical roots and ethnological sources, which have also influenced modern meta-theoretical perspectives and practices. The next stage marks the heterogeneous origins of modern music therapy in the 20th century that mirror psychological positions and novel clinical ideas about the healing power of music and the arts. The following heyday of music therapeutic models and schools of thought yielded an enormous variety of concepts and methods such as Nordoff-Robbins music therapy (MT), Orff MT, Analytic MT, Regulatory MT, GIM or Sound Work. As music and arts therapies gained in international importance, clinical applications required research about their therapeutic efficacy. According to standards of evidence based medicine and with regard to clearly defined diagnoses research on music therapeutic practice became the core of stage four. The present stage is characterised by an emerging epistemological dissatisfaction with the paradigmatic reductionism of evidence based medicine and the strong will to discover the ‘true healing nature’ of music. This trend has given birth to interdisciplinary hermeneutics for novel foundations of music and arts therapies. Epigenetics, neuroplasticity, regulatory and chronobiological sciences, quantum physical philosophies, universal harmonies, spiritual and religious views, and the cultural anthropological phenomenon of aesthetics and creativity have become guiding principles. The present paper relates to the author’s EASA speech on the 2nd of December 2022 about landmarks in the evolution of modern music therapy and its interdisciplinary perspectives.

Correspondence: Wolfgang Mastnak.
E-mail: wolfgang.mastnak@hmtm.de

Key words: complexity sciences; cultural evolution; cultural sensitivity; ethnomedicine; interdisciplinarity; medical meta-theory; quantum mind; underlying mechanisms.

Acknowledgements: interdisciplinary research on music therapy and aesthetics was greatly supported in inspired by the Shanghai Music Aesthetic Theory and Practice Research Group under the guidance of Prof. Dr. Danhong Yu, curator of the Shanghai Conservatory of Music.

Received: 4 March 2023.
Accepted: 2 April 2023.

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Licensee PAGEPress, Italy
Proceedings of the European Academy of Sciences & Arts 2023; 2:3
doi: 10.4081/peasa.2023.3

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Introduction

The evolution of the human race is inextricably intertwined with symbolic, aesthetic and creative phenomena – shortly, the arts, which are not only a vivid expression of cultural dynamics, but have also been serving as curative media for time immemorial.

Today’s clinical circles and public health systems apply the arts through approaches like music therapy or dance therapy – or they use holistic models such as Sound Work, Orff Music Therapy or Inter-modal Expressive Therapy. In medicine, arts therapies are used in disciplines such as neuro-rehabilitation, paediatrics, psychiatry, geriatrics, psycho-oncology and obstetrics, while specific arts therapeutic techniques are precisely tailored to distinct medical conditions such as acquired brain injury, autism spectrum disorder, eating disorders, schizophrenia or Alzheimer’s dementia.

Clinical benefits call for research on underlying mechanisms – in other words: why and how can arts alleviate symptoms or (help to) cure diseases? In this context, one of the most important support comes from neurosciences. By way of illustration, music is a vital promotor of neuroplasticity, which is important for psychotherapeutic changes or the regeneration of affected neural networks. Moreover, the arts can importantly stimulate the default mode network, an enormous information processing system, which is, however, not accessible to our conscious mind. Arts-based therapies also have a strong impact on the limbic system, which generates and modulates emotions, and even can boost the activity of the nucleus accumbens, the brain’s “joy centre”, hence its importance in mood disorders such as depression.

However, neurosciences are only one approach to explore the mechanisms underlying the therapeutic effect of the arts. Re-

cent activities also involve quantum consciousness and quantum spirit, as well as cross-cultural and culturally sensitive medicine, e.g. traditional Chinese medicine or shamanistic rituals and associated myths. Arts-based therapies are likely to have a flourishing future, and interdisciplinary research is needed to get deeper insights into their complex dynamics, as well as to optimise their multifaceted methods.

The present article intends to contribute to the EASA's profound communication between sciences and the arts and involves the author's previous work about evolutionary characteristics of music therapy (Mastnak, 2015a). Relevant findings during the last ten years have importantly substantiated those perspectives and hypotheses. Suggesting a theoretical framework, this new article encourages further interdisciplinary and translational research and aims at increased compatibility of culturally sensitive arts-based therapies with high-standard clinical practice and public health systems, also in the sense of the World Health Organization.

Evolutionary and anthropological perspectives of healing music

“Now the Spirit of the Lord had departed from Saul, and an evil spirit from the tormented him ... Whenever the spirit from God came on Saul, David would take up his lyre and play. Then relief would come to Saul; he would feel better, and the evil spirit would leave him” (1 Samuel 16: 14 & 23).

This famous narration is often considered the cradle and divine legitimisation of music therapy. Myriads of comments hypothesise crucial therapeutic factors of that stunningly efficient, though ‘non-professional’ music therapy. David played a kinnor, an ancient Israelite instrument that was probably similar to a lyre, but not a harp. F.D. Maurice (1805-1872) saw David's music as a means to bring back the sense of true order and inward harmony (Ellicott, 2015), an idea that also appears in several ethnological and modern concepts of music therapy.

While this Biblical tale does not mention “underlying therapeutic mechanisms”, Plato's treatise *Timaeus* elucidates: “Music too, in so far as it uses audible sound was bestowed for the sake of harmony. And harmony, which has motions akin to the revolutions of the Soul within us, was given by the Muses to him who makes intelligent use of the Muses, not as an aid to irrational pleasure, as it now supposed, but as an auxiliary to the inner revolution of the Soul, when it has lost its harmony, to assist in restoring it to order and concord with itself” (Plato, 1925 - section 47c-d).

2500 years ago, Plato –Πλάτων – opposed the attitudes of ‘fun societies’ and attached greatest importance to the harmonic principles of life. Nowadays, his critical argument applies to positions which narrow the efficacy of music therapy down to (superficial) pleasure. In order to avoid misinterpretation: music-evoked joy can serve as an essential agent of music therapy. And yet, complexity sciences suggest understanding music therapy in a systemic and holistic way. Plato, however, was not the first to emphasise the healing power of music: in *Jamblichos* Pythagoras – Πυθαγόρας ὁ Σάμιος – pointed out that music is able to contribute considerably to individual wellbeing (von Albrecht, 1963). Moreover, according to Damon, a music theorist of the 5th century BC, and teacher of Socrates and Pericles, music imitates the movements of the soul, hence its “psycho-

logical” power. Broadly speaking, music – in Ancient Greek understanding – has two faces: on the one hand it can suppress or control human desire and drive (Trieb), hence its educational and moral impact. On the other hand, it can soothe the disturbed “animal” part of the human soul, hence its therapeutic nature. Accordingly, Greeks of the classical period used to attribute the gift of music to both Apollo and Dionysos, highlighting its dual – educational and cathartic – puissance.

Orpheus – no matter whether he was a historical figure or a splendid invention of Greek mythology – was of seminal importance for Western music history: While Jacopo Peri's “Dafne” is usually regarded as the first opera (the earliest surviving opera, however, is Peri's “Euridice”), Claudio Monteverdi's “L'Orfeo” has given rise to the heyday of this musical genre and is the earliest opera which is still regularly performed. And until today Orpheus has been inspiring operas such as Yiannis Markopoulos's “Orpheus and Euridice”. As myths tell, Orpheus's music was so entrancing that animals and women naturally flocked to be in his presence. Today, vocal therapies are significantly in the ascendant, and Teresa Tièschky's (today married Boning) Arion Psychovocal Therapy (Tièschky and Mastnak, 2016) afresh refers to Ancient Greek roots: singing can save lives – such as in suicidal psychiatric patients.

While the world of music therapy pays surprisingly little attention to Orpheus, the followers of the Orphic cult as well as Pythagorean philosophers clearly emphasised the music's therapeutic potential. In combination with ascetic lifestyles, music was seen as a technique to facilitate the soul's therapeutic catharsis – and two purifying chant genres came into play: paeans and epodes. Regarding Liritzis *et al.* (2017) profound work on archaeoastronomy, Apollo oracles and Apollo-Asclepius related cult, we are afresh faced with interdisciplinary and evolutionary challenges of music therapeutic research: the wealth of relevant sources in Ancient Greece.

From ancient times until today music therapeutic views have been a mirror of profound differences between scientific and spiritual approaches. By way of illustration, in 1316 the Council of Cologne declared that singing the antiphon *Media Vita* for therapeutic purposes would require the bishop's permission (Engel, 1968), while in 1392 Eustache Deschamps (Raynaud, 1891) considered music the medicine of the seven liberal arts. Kümmel (1977) unearthed the immense richness of music therapeutic theories and practices between 800 and 1800, which relate to obstetrics, paediatrics, geriatrics, digestion, sedation, fever, neurological conditions such as epileptic fits, psychiatric issues such as manic and depressive disorders, or the support of erotic feelings and sexual functions.

It goes without saying that Plato's explanations ranks among historical roots of music therapy. In many other cases, however, it is quite impossible to differentiate between historical and ethnological perspectives. In 1976 Oruç Güvenç (1948- 017) (Güvenç, 2006) founded the research group *Tümatá* – and a new movement of Turkic music therapy was born (Tucek, 1977; Tucek and Mastnak, 1998). Investigations shed light on the relationship between ancient and modern pathological conditions and clinical practices alongside the issue how findings would apply to differently acculturated populations. The more research focused on the mystery of music therapeutic efficacy, the more emerged epistemological inconsistencies between spiritual and scientific positions, hence the challenge of finding a balance between Sufism and Western medical sciences in today's school of Ancient Oriental Music Therapy.

From a European point of view, practices of Chinese healing

music may be regarded as ethno music therapy. Nonetheless, Chinese medicine is also applied in the Western world and several models of Chinese music therapy, e.g. Musical Qigong (Wu, 2001), have gained a foothold in Western music therapy. Other Chinese techniques, such as Five-Element Music Therapy, take core elements of Chinese health traditions, design new methods, and study them according to standards of evidence based medicine (Liao *et al.*, 2013; Liu *et al.*, 2014). Recent clinical research in China focused on the benefits of an intermodal use of the cither Guqin (□□) in oncology, e.g. to alleviate sleep in gastric cancer patients (Mao and Mastnak, 2022).

How to distinguish adequately historical, ethnological and contemporary aspects, and constituents of music therapeutic developments deserves complex in-depth investigations. This also relates to traditions which encompass multiple health-related functions but are not referred to as ‘music therapy’. For instance, traditional folk music of Carinthia or the Bavarian Alps may have positive impact on mental catharsis or emotional stabilisation, although these vivid traditions are not (primarily) regarded as music therapy (Mastnak and Astner, 2017). Akin to these phenomena, traditions of North Vietnamese shamanism, which importantly comprises chant and instrumental music, can be regarded as culturally sensitive psychotherapy and psychosomatic treatment (Mastnak, 2023). Arts-based healing traditions and modern clinical and public health practices are about to converge and require new ways in interdisciplinary understanding of health promotion.

Cross-cultural transferability of ethnic therapeutic practices represents one of the cardinal issues in the global scene of arts-related therapies. As regards cultural sensitivity, anthropological constants have to be differentiated from indigenous cultural phenomena. Multidisciplinary research is called to distinguish ethno music and arts therapeutic elements which relate to common principles in the human race from those which are inseparably connected with regional cultural evolutions. In this domain, the French dance therapist, psychoanalyst and researcher France Schott-Billmann (2014) has essentially contributed to the understanding of anthropological invariants and specific cultural features of arts-based therapies, and dance-rhythm therapy in particular.

Experiences with traditional microtonal music therapy inspired research on therapeutic aspects of classical Indian Music. In this context, the author of this article found in Nepal a paper from Pakistan associating following rāga with clinically relevant phenomena: Ptlu – melancholia, Bhimpalāsī – worldliness, Darbari (Darbari Kanada) – insomnia, headache, fever, Malhar – low blood pressure, Kalyān – high blood pressure. In her PhD-research, Lasanthi Manaranjanie (2010) discovered relevant effects in European cardiac patients. While these results point to possibilities of cross-cultural clinical application, e.g. indigenous music healing rituals of Sri Lanka may not be rooted out and “transplanted”. Nevertheless, some general principles also apply to therapeutic issues of “today’s modern city life environment” (Lasanthi Manaranjanie, 2013).

The wealth of historical and ethnological applications of the arts for healing purposes substantiate the hypothesis of the profound curative power of entities such as music, dance, drama or the visual arts. On the first Asia Pacific Congress of Music Therapy in Beijing in 2019, ethno musicologist La Verne C. Dela Peña from the University of the Philippines emphasised that the healing potential of music belongs to the whole mankind. Its reliable practice calls for interdisciplinary research, though.

Rediscovery of music therapy in the 20th century

Studies on the widely branching origins of contemporary music therapy are elucidative for the understanding of its actual complexity. While it is impossible to exactly mark the birth of contemporary music therapy, we should rather focus on individuals who were captivated by therapeutic effects of music and contributed gradually to a common awareness of possible clinical benefits of rhythm and sound.

Two medical dissertations, one published by Edwin Atlee in 1804 (Davis, 1987), the other edited by Samuel Mathews in 1806 (Davis and Hadley, 2015), are often considered the cradle of American music therapy. About 100 years later, James Leonard Corning’s systematic experimentation in music therapy became a cornerstone for the development of modern music therapy (Davis, 2012).

A first conflict between the American way to understand music as a means to influence the somatophysiological system and Western depth psychological approaches was initiated by Aleks Pontvik (1962). Referring to theories of his teacher C. G. Jung and Kayser’s (1946) science of world harmonics, he created a novel music therapeutic concept (Pontvik, 1948, 1955) and saw himself as the founder of modern music therapy. These different ways of using music for therapeutic purposes developed into such clear-cut concepts that from 1965 on the German music therapist Christoph Schwabe (1967) distinguished them as contrasting schools of thought, and Walter Simon (1974) differentiated between a depth-psychological Swedish and a sociological psycho-analytic American school of music therapy.

Pontvik’s and Schwabe’s œuvre influenced considerably Middle European music therapy. This time can be understood as the dawn of modern music therapy in the Western world. It was characterised by individual attempts and the excitement about creating something new, as well as by individual failure, disappointment and shattered dreams. Forgotten names of this early period of music therapy would be worth rediscovering. There is a huge lack of research on those roots of music therapy which could importantly enhance our insights into the spirit of music therapeutic evolution.

Models and schools of music therapy

Christoph Schwabe’s doctoral thesis (1967) is a comparatively early scientific treatise on origins and developments of contemporary music therapy. Since that time research on music therapeutic models and schools of thought has become an important tool to facilitate orientation within a jungle of concepts and practices – and publications such as Kenneth E. Bruscia’s “Defining music therapy” (2014) have given rise to further meta-theoretical discussions in this domain.

Particularly from a middle European perspective Aleks Pontvik’s concept has essentially influenced the development of modern music therapy – and his theories on world harmonics rank among the cornerstones of early music therapy in Austria (Fitzthum, 2013). Although Pontvik was Swedish, Ingrid Hammarlund (2008) marked the visit of Paul Nordoff and Clive Robbins in 1974 as the beginning of the development of music therapy in Sweden, while German speaking music therapists tend to call Pontvik’s concept the *Schwedische Schule der Musiktherapie* (Swedish School of Music Therapy). In close collaboration with

Editha Koffer-Ullrich and Hans Sittner, Aleks Pontvik became a main initiator of the Viennese School of Music Therapy (Fitzthum, 2005). In 1959 the first European music therapy training programs were opened in Vienna and London. With a certain focus on psychotherapeutic issues (Mössler 2010, 2011) the Viennese school became the cradle of integrated music therapy (Schmölz, 1982, 1987).

The following decades gave rise to a wealth of music therapeutic frameworks. Four aspects may facilitate structured discussions about and systematic approaches towards related models and concepts: i) theoretical foundations, ii) methodology and therapeutic efficacy, iii) position within public health systems, and iv) potential cross-cultural benefits. Comparative research on music therapeutic publications in different languages identified various music therapeutic networks with relatively sparse mutual interchange among each other, while improved “permeability” could significantly widen the horizon of global music therapy.

There are, for instance, good reasons to assume that Nordoff-Robbins Music Therapy and Orff Music Therapy (Orff 1974, 1984; Keller, 1982), which was founded by Gertrud Orff and must not be confused with Carl Orff’s educational approaches, could “complement” each other. Although both are autonomous, consistent and well-defined systems, they share similar aims and visions such as transforming lives through the human ability of responding to music. Exchanging different therapeutic experiences and integrating methodological approaches could enrich each other, encourage comparative research and eventually result in novel therapeutic repertoires and theories.

The comparison of Schwabe’s (1987) model of regulatory receptive music therapy with Guided Imagery and Music (GIM) / The Bonny Method reveals common principles, which may encourage in-depth investigations and thus enrich research on GIM (Grocke, 2010). Both concepts involve theoretical elements of depth psychology, both use music to trigger inner images and meaningful visions, both include verbal modes of communication and elucidation. Further comparative and meta-theoretical studies are likely to unearth healing principles and open new horizons. By way of illustration, Schwabe’s (2005) shift from a “primarily pathogenetic to a salutogenetic approach” could also inspire GIM to explore the balance of psychopathological foci and holistic wellbeing. The time seems to be mature for complex comparative research that transcends the frames of concepts and helps to avoid the risks of ideological or idiosyncratic rigidity.

While depth-psychological models of music therapy were in the ascendant, behavioural approaches such as Clifford K. Madsen’s concept (Madsen *et al.*, 1968) did not find the same support within the Western music therapeutic community. This astonishing fact provoked conjectures about biased attitudes and lobbying within certain arts therapeutic circles. In general, more open-minded recognition of other perspectives such as Isabelle Frohne-Hagemann’s (1990) and Rosemarie Tüpker’s (2007) studies on music and gestalt would inspire a broader view of psychological foundations of music therapy, alongside innovations such as morphological music therapy (Tüpker, 2004). However, music therapeutic frameworks should not be narrowed down to psychotherapeutic reasoning. For instance, the voice-group-based system *Sound Work* suggests interdisciplinary efforts to harmonise clinical pragmatism, theoretical foundations and cross-cultural requirements (Mastnak, 1992, 2000, 2016, 2018).

In English speaking music therapeutic areas French models and schools of thought seem to be remarkably underrepresented. And yet, intensified cross-cultural discussion could significantly widen the angle of music therapeutic views. By way of illustra-

tion, anthropologic psychoanalytic findings (Gillie, 2008) essentially contributed to depth-psychologically oriented music therapy and interdisciplinary French models (Goudard and Mercier, 1999) importantly promoted inclusive music education. Edith Lecourt’s publication in English (2004) may be seen as a bridgehead for improved ‘inter-linguistic’ music therapeutic communication, while the international music therapeutic community should also be aware of the wealth of relevant literature in other languages.

Finally, we have to take into account that some concepts of high value are only published in smaller countries, such as Matěj Lipský’s Czech model *Podpůrná vývojová muzikoterapie* (Supportive Developmental Music Therapy - SDMT) (Mastnak and Kantor, 2014, p. 283). And we have to consider new and promising concepts from around the world, such as Hyunju Kim’s Korean *Creative Pansory* (Kim and Mastnak, 2016). A comprehensive view over the wealth of music therapeutic models and schools in the world needs improved and adequate cross-cultural research.

In clinical and public health areas the golden era of these models and concepts, which are often taken as a sort of panacea, seems to be over, though. There is a new plausible and sense-making trend to provide diagnosis-oriented techniques, which also respect individual and cultural backgrounds, as well as evidence-based estimations of therapeutic outcomes and health benefits. While many of the models and schools presented in this section are based on subjective theories and ideas, the “models” of the new era, which is the core of the next section, are based on constructive research, such as approaches designed for Chinese children and adolescents with distinct medical conditions: attention deficit hyperactivity disorder (Mastnak, 2022a), oppositional defiant disorders (Mastnak, 2022b), depression (Mastnak, 2022c), anxiety disorders (Mastnak, 2022d), eating disorders (Mastnak, 2022e), stress-related syndromes (Mastnak, 2022f) or mental health issues associated with the COVID-19 pandemic (Mastnak, 2022g).

Diagnosis-oriented music therapy and evidence based medicine

In clinical practice, development of methods and evaluation of therapeutic effects are often intertwined processes. Regarding the evolution of – particularly Western – music therapy, however, allows to distinguish an era of creating models and a consequent stage of testing them in diagnosis-specific settings. Widely in line with principles of evidence based medicine, randomised control trials have become a standard of good practice. Nowadays, however, science theoretical considerations suggest meta-methodology studies to explore adequacy and limitations of such pre-defined techniques – and truth theories, complexity sciences and scientific aesthetics substantiate these arguments.

Diagnosis oriented music therapy can be traced back to ancient times, as well as to movements in the 1970s (Willms, 1982; Schwabe, 1982; Jaedicke, 1982). The era, this section is dealing with, focuses especially on specific effects of music therapy in patients with distinct diagnoses. Research comprises nearly the whole medical spectrum including neurology and neuro-rehabilitation (Raglio *et al.*, 2015; Mastnak, 2015b; Gerlichova *et al.*, 2021; Xu *et al.*, 2022), psychiatry (Carr *et al.*, 2013; Gassner *et al.*, 2022) or psycho-oncology and palliative oncology (Archie *et al.*, 2013; Mastnak *et al.*, 2020). It goes without saying that these eclectic examples only serve as a *pars pro toto*: the range of diagnosis specific studies and applications in this field is immense.

The vast amount of review studies and meta-analyses on music therapy in patients with various diagnoses mirrors typical features of this stage: in psychiatric domains music therapy is applied in patients with schizophrenia and psychotic disorders (Mössler *et al.*, 2011; Jia *et al.*, 2020), depressive conditions (Maratos *et al.*, 2008; Aalbers *et al.*, 2017), and a multitude of other mental and affective issues. Music therapy also improves sleep quality in acute and chronic sleep disorders (Wang *et al.*, 2014; Loewy, 2020) and reduces stress and anxiety in patients with various diagnoses such as coronary heart diseases (Bradt *et al.*, 2013). In the realm of psychiatry and psychosomatics, music therapy also encompasses psychotherapeutic functions.

Music therapy has gained ground as intervention for cardiovascular patients and cardiac health care in general (Hanser, 2014; Mastnak, 2014; Kulinski *et al.*, 2022) – and it plays a role in the treatment of chronic obstructive pulmonary diseases (Panigrahi *et al.*, 2014; Huang *et al.*, 2021). Music therapy has become an important support for patients with oncological diagnoses and yields both psychological and physical results (Burns, 2012; Zhang *et al.*, 2012, Archie *et al.*, 2013; Bradt *et al.*, 2021). Moreover, music therapy has become a certain standard in treating dementia in general (Sherratt *et al.*, 2004; Mastnak *et al.*, 2017; Lam *et al.*, 2020), and Alzheimer's disorder in particular (Witzke *et al.*, 2008; Matziorinis and Koelsch, 2022) – the sequence of diagnoses can be carried on through nearly all medical disciplines.

Diagnosis-specific applications of music also involve movement and body-oriented approaches (Mastnak, 2020): music therapy with rhythmic auditory cuing improves walking in patients with neurological conditions (Wittwer *et al.*, 2013) and parkinsonism (Nombela *et al.*, 2013; Machado Sotomayor *et al.*, 2021). Highly specified methods involve audio-motor coupling in music-supported therapies such as for stroke patients and people with basal ganglia dysfunction (Rodriguez-Fornells *et al.*, 2012; Baedeker, 2022).

Since the dawn of contemporary music therapy paediatric conditions have marked a main field of clinical and special educational practice, such as autism spectrum disorder (Geretsegger *et al.*, 2014; Mastnak *et al.*, 2018; Sharda *et al.*, 2019). Moreover, music therapy plays an important role in antenatal and perinatal care, as well as in neonatology (Hollins Martin, 2014; Mohan *et al.*, 2021).

In short: This era is characterised by diagnosis-specific music therapeutic treatment and a striking dominance of evidence based medicine – or, more precisely, the belief in evidence based medicine as a sort of epistemological credo. In this domain and according to its scientific belief, randomised control trials are regarded as the “supreme design”.

The first paragraph of this section already mentioned fundamental problems with RCTs in arts-based therapies. There are plausible reasons why randomised controlled trials are not unanimously accepted as best tools for music therapeutic studies. RCT-based research postulates the scientific adequacy of comparing randomised samples for “mono-dimensional parameter analyses”, which only consider a single qualitative trait or feature through its numerical representation. Aspects such as individual acculturation or aesthetic experiences are widely ignored. Moreover, RCTs cannot reveal the essence and – also artistic – quality of clinically effective music therapy.

Within the realm of music therapy, one of the harshest comments on evidence-based practices came from Kenneth Aigen (2015), who identified problems such as narrow understanding of the nature of science, restrictive notions of evidence, and methodological issues in randomised controlled trials. His critique deval-

uated this (medical) research model as inadequate for music therapeutic purposes. Further criticism is also based on mathematical and statistical arguments (Mastnak, 2021). Among other fundamental epistemological doubts, randomisation does not necessarily provide the statistical equality of test group and control. And as regards blinded trials we have to point out that music therapy participants cannot be blinded: What should, for instance, a musical “placebo” be?

Alongside the problem that evidence based research does not consider the nature of therapeutic effects, there is a sensitive lack of valid outcome measures that particularly focus on the aesthetic and creative essence of music therapy. Broadly speaking, the time is ripe for research that essentially deals with the nature of music and the arts in therapeutic and health promoting processes.

Underlying mechanisms and therapeutic essence

About two decades ago Brynjulf Stige (2001) pointed out that “More than one philosopher has tried to develop a theory of knowledge that may go beyond objectivism and relativism ... it is – at a more pragmatic level – possible to suggest that music therapy as a broad and open field of knowledge will suffer if one tradition of research dominates or even represses others”.

From an epistemological perspective, findings achieved by randomised control trials are of limited explanatory power. They embody their standardised design as well as beliefs in the adequacy of randomised distributions, the reduction of individuals to singular parameters, and numerical data representing the essence of the phenomena referred to. For numerous medical purposes these guidelines are of high pragmatic and clinical value. Music therapy, however, is not necessarily comparable with biochemical and pharmaceutical treatment. By way of illustration, there is no musical placebo and there are no feasible double-blind study designs for music therapy. However, music therapy involves subcortical and cortical activities, hence the need for interdisciplinary neuroscientific research. Music-related physiological and psycho-affective processes are different from medical treatment in the sense of conventional Western medicine.

With regard to history of psychology, principles of evidence based medicine (Howick, 2011) resemble the credo of early behavioural standpoints and the dominating scientific model of the black box (Hersen and Gross, 2008). Perfectly complying with formal criteria of scientific objectivity, these research modes became finally the target of humanistic psychological criticism, though. Methodological reductionism that would replace real people with a framework of data was no longer seen as an adequate means for psychological understanding – considerations that gave in the end rise to the cognitive revolution in psychology. Interdisciplinary efforts aimed at the discovery of the actuality and true nature of individuals.

In the realm of music therapy, Christian Gold (2008) was one of the first to criticise the dominance of evidence based medicine. Identifying crucial problems, he emphatically advocated science theoretical approaches that tally with the characteristics of the arts in clinical contexts. Such considerations involve science philosophical questions and call for meta-theoretical investigations (Bonde, 2001).

The will to elucidate the mystery of healing music has initiated a similar revolution in music therapy. On the one hand

RCTs are no longer regarded as the gold standard in music therapeutic research, on the other there are serious doubts about the validity of speculative theories and their inherent explanatory patterns. In this context, Claire Ghetti (2012) claimed progress of music therapeutic theories that explain music therapeutic processes in an adequate way. Likewise, the relevance of meta-analyses and evidence based reviews for music therapeutic practice and understanding was critically discussed by Barbara Else and Barbara Wheeler (2010). Not at least influenced by such positions, science theoretical and meta-methodological progress in music therapeutic domains resulted in a multifaceted field of interdisciplinary approaches, which are about to redefine scientific guidelines for research in music therapy. What is called “disruptive innovation” in business and technology (Naughton, 2014) also relates to clinical and public health paradigms, hence the new era of complexity science and interdisciplinary research in music and arts therapeutic areas.

Nonetheless, attempts to explore the depths of music therapeutic mechanisms are not meant to categorically replace previous scientific modes. Randomised control trials are still important to estimate effect sizes of music therapeutic techniques and music applications for health purposes such as classical Indian music to improve the quality of sleep in depressed patients (Deshmukh *et al.*, 2009). Likewise, behaviour analytical tools – e.g. the *Music Therapy Analyzing Partitura* (Gilboa, 2012) – are still of pragmatic value and needed to describe and assess music therapeutic sessions.

Introducing the following approaches towards an “inner understanding” of music therapeutic processes may look inconsistent and conflicting with “logic” developments in music therapy – and there is a double rationale in this argument. First, these novel attempts to study the healing essence of music do not derive from the core of music therapeutic frameworks and concepts, but belong to other scientific areas. Integrating perspectives can be considered a disruptive innovative approach that usually causes contradictions and provokes opposite standpoints – in music therapeutic domains as well. However, from a dialectic perspective such processes are likely to result in new discoveries and advanced practice.

Second, these scientific approaches are neither methodologically nor theoretically pre-connected, although they may relate to the same ontological truth. Such considerations involve philosophical issues and fundamental questions of music therapy, though. To encourage unconventional trans-disciplinary reasoning, each of the following sections presents a “crucial idea” referring to main hypotheses and issues. They are philosophical invitations, which must not be seen as “proved facts”, though.

Epigenetics

Crucial idea: Music influences epigenetic mechanisms and is hence able to regulate gene-expression in a therapeutic way

Epigenetic studies have changed the views of genetic determination and innate destiny. Hallgrímsson and Hall (2011) suggested that biological systems are functionally indeterminate in the sense that their complexity prevents us in most cases from creating frameworks that predict phenotypic outcomes directly from DNA sequences or sequence variations.

In nearly all medical and therapeutic disciplines the discovery of modifiable gene expressions has caused a new awareness of heritability and initiated novel methodologies. This remark-

able step in the evolution of sciences is also mirrored by new ways of music therapeutic thinking. In contrast with evidence based studies in music therapy, epigenetic approaches aim to reveal essential principles, which also involve issues of basic, applied and trans-disciplinary music psychological research such as how listening to music regulates microRNA expression in general (Nair *et al.*, 2021) – and likewise music performance in professional musicians (Nair *et al.*, 2019).

About ten years ago an Italian research team (Brigati *et al.*, 2012) stated that humans are transient beings in a world of constantly changing culture: “Music is an art and a highly transmissible cultural product, but we still have an incomplete understanding of how our musical experience shapes and is vividly retained within our brain, and how it affects our behavior. However, the developing field of social epigenetics is now helping us to describe how communication and emotion, prime hallmarks of music, can be linked to a transmissible, biochemical change.” This standpoint has been substantiated by recent studies on creativity in dancing, music and the visual arts (Sotiropoulos and Anagnostouli, 2021): the distinct interplay between genetic structures and epigenetic dynamics matters.

The idea of an epigenetic foundation of music therapy is both exciting and promising. By way of illustration, epigenetic mechanisms modulate the beneficial effect of music in preterm born infants in neonatal intensive care such as for stress-reduction and neurodevelopmental support (Anderson and Patel, 2018) – and at the other end of our lifespan sensogenomics of music play a role in treating Alzheimer’s disease (Navarro *et al.*, 2023).

And yet, we have to take into account that epigenetics is a relatively young discipline and particularly epigenetic studies in music are still rare. Since Conrad Waddington introduced “epigenetics” in 1942, the term has been redefined several times. Today a – perhaps still preliminary – consensus definition of epigenetics involves collective heritable changes in phenotype due to processes that arise independent of primary DNA sequence. The heritability of epigenetic information was for many years thought to be limited to cellular divisions. However, it became apparent that epigenetic processes can be transferred in organisms from one generation to another (Tollefsbol, 2011).

Such definitions are based on interdisciplinary biological findings and involve issues of cultural traditions, ethnological features and individual acculturation. These are of high relevance for music education, preventive aspects of music therapy, cultural sensitivity and a therapeutic understanding of music as a “long-term agent”.

Neuroplasticity

Crucial idea: Music influences the dynamic transformation of neural networks and helps to re-construct central nervous systems in a therapeutic way

While epigenetic music therapy is still in statu nascendi, the phenomenon of neuroplasticity has considerably gained in importance for music-biological sciences and music medicine – and a relatively early literature-based study called music therapy “a powerful tool to enhance neuroplasticity in the brain” (Stegemöller, 2014).

Positions considering neuroplasticity a crucial principle of music therapy can be traced back to analyses of the musician’s brain, as well as to neuroscientific animal experiments. Findings

that the brain of musicians differs significantly from the average (Schlaug *et al.*, 1995; Elbert *et al.*, 1995) encouraged further music-neuroscientific research, which was complemented by investigations of neuroplasticity in the auditory cortex and its environmental and training interdependencies (Rauschecker, 1999). Finally, the musician's brain was discovered as a most adequate model for studying neuroplasticity (Münte *et al.*, 2002) – and basic research resulted in early neuroplasticity-based music therapeutic training models (Baker and Roth, 2004).

Nonetheless, regarding the general principle that stimulation triggers the growth of neural networks in the corresponding cortical area, these were not really stunning arguments. By contrast, that early music exposure improved maze learning in rats (Rauscher *et al.*, 1998) was somewhat of a surprise. By means of what mechanisms music was able to enhance such learning abilities formed a question that pointed to new cognitive key functions. Numerous results from cognitive neurosciences provided evidence that “musical stimuli modify autonomic and neurochemical arousal indices, and may also modify synaptic plasticity” (Rickard *et al.*, 2005). These positions were underpinned by neuroscientific animal studies on neuroplasticity changes by musical stimuli (Sheikhi and Saboory, 2015).

Findings suggested a hypothesis which reminded more of medical science fiction than of serious research: Music does not only correspond to auditory areas but must be considered a general facilitator for neuroplasticity. Therewith three main issues characterised the related scientific spectrum: a) How does music influence neuroplasticity of related auditory and motor areas? b) How does music interrelate with complex cerebral and cognitive functions and is hence able to exert ubiquitous influence on neuroplasticity? c) Is there a functional unit linking musical triggers and neuroplasticity responses?

While music educational experiments showed that “long-term instrumental music training is an intense, multisensory, and motor experience and offers an ideal opportunity to study structural brain plasticity in the developing brain in correlation with behavioral changes” (Hyde *et al.*, 2009), other studies revealed further astounding facts about different cerebral responses to music.

In 2009, Chaudhury and Wadhwa published their study on the effect of prenatal auditory stimulation on the development of the chick auditory pathway and the hippocampus. The effect on the auditory pathway is plausible, the effect on the hippocampus – at first glance – surprising. In addition to such animal studies on cerebral sound responses, musical training has finally been discovered as an activity influencing functional hippocampal plasticity (Herdener *et al.*, 2010; Groussard *et al.*, 2010).

Considering the hippocampus as a facilitator of neuroplasticity and neurogenesis, a possible double role of music in therapy springs to mind: firstly, as a means to enhance neuroplasticity alongside associated benefits such as in children with cerebral palsy. And secondly, music as a booster of neurogenesis, e.g. in patients with acquired brain injury. Such ideas resulted in practical approaches (Scholz *et al.*, 2015).

Neuroscientific research has identified music as an efficient tool to enhance neuroplasticity across the life span and as “an interactive treatment of intervention for neurological and developmental disorders, as well as those associated with normal aging” (Wan and Schlaug, 2010) – and interdependencies between music and neuroplasticity have become a main basis for the explanation of the efficacy of music therapy. Today, enhancement of neuroplasticity is a standard criterion for music therapy in neurorehabilitation (Chatterjee *et al.*, 2021), e.g. after trau-

matic brain injury (Siponkoski *et al.*, 2020; Martínez-Molina *et al.*, 2021).

The profound connection between music and neuroplasticity is not limited to the realm of neurorehabilitation, though. Broadly speaking, all therapeutic processes which require cerebral changes can profit from the plasticity-boosting effect of music such as foetal and neonatal brain development (Chorna *et al.*, 2019).

For some years, research has also emphasised aesthetic perspectives within the dynamic connection between music and neuroplasticity (Reybrouck and Brattico, 2015). Such positions suggest that music-induced plasticity must not be narrowed down to mere somatic functions but also requires interdisciplinary understanding of artistic experiences. These are key topics of the research group on aesthetics of the Shanghai Conservatory of Music (head: Danhong Yu).

Regulatory principles and chronobiology

Crucial idea: Music and life are interconnected through the same “timeline”; the “harmonic nature” of music is interconnected with the “harmonic balance” of psycho-physiological systems. By means of such analogies music creates therapeutic effects

Regulatory principles in music therapy postulate a close connection between music and the individual. For instance, the concept of analogy as proposed by Smeijsters (2012) explains “the musical experience by means of the isomorphism between the forms of vitality affects in the core self and the forms of musical phrases” and suggests a plausible model to elucidate inter-dependent regulatory processes. In therapeutic practice these include both auditory perceptive approaches and self-organisation processes such as in improvisational music therapy (Schmid, 2014).

Later studies (Reybrouck *et al.*, 2021) argued “for a biological conception of music listening as an evolutionary achievement that is related to a long history of cognitive and affective-emotional functions, which are grounded in basic homeostatic regulation”. From an integrated perspective of holistic psychosomatics and trans-disciplinary music therapy, regulatory principles appear as one of its most promising prospects: music as a means to re-establish psychosomatic equilibrium. Analogies with ancient positions such as Plato's views of the healing principles of music (cf. section 2, Plato, 1925, section 47c-d) spring to mind.

Regulatory principles in music therapy essentially relate to subcortical processing of stimuli, which serve as regulatory triggers within somatic systems, while cortical processing is widely regarded as psychological agent. Today a wealth of studies suggest that these have to be understood as intertwined areas, though.

According to chronobiology (Balzer, 2009) the time factor plays a decisive role for specific music therapeutic effects, and interconnections between chronobiology and regulatory medicine became a distinct research topic in music therapy (Tucek *et al.*, 2014). However, already Frank (1982) suggested musical rhythms as a possible synchroniser of biological rhythms. Despite a certain lack of newer studies on music therapy and chronobiology, regulatory principles of music in therapeutic contexts have particularly gained practical clinical importance, such as how Tibetan music regulates neuroendocrine and autonomic functions in patients (Cotoia *et al.*, 2018).

The subatomic “Third”

Crucial idea: The philosophical mind-body-dualism is erroneous. Matter and mind are phenomena that derive from one most essential “energetic life principle” that is neither of physical nor of psychological quality. This “energy” and the nature of sound are interrelated

Since Ancient Greek philosophy the body-mind-dualism has tormented Western thinking and Western sciences. Re-defined by René Descartes, this polarity became finally a driving force in neuropsychology, hence the attempt to discover the transition from matter to mind. Despite successful approaches towards micro-structures, the crucial problem of this metamorphosis seemed to remain unapproachable – similar to the famous metaphor in Franz Kafka’s novel *The Castle* “although it moved no further away from the castle, it came no closer either”.

There are good reasons to assume that the question was not well posed – and the idea of a quasi “horizontal”, thus direct, transition from matter to mind began to crumble. Inspired by quantum physics and quantum field theory, a physical top-down and psychological bottom-up model was built (Mastnak, 2013). The top-down side comprises cascades of qualitative leaps: body → cell → molecules → atoms → subatomic particles → basic quality. The bottom up-side encompasses (still not so distinct) cascades of qualitative leaps towards the human awareness and mind.

The deepest level, the “basic quality”, however, seemed to be neither of physical nor of mental quality. This crucial entity rather resembles what Chinese medicine calls the Qi (气): a vital energetic “fluidum”. Moreover, both from a physical and an information theoretical perspective we may assume a certain kinship between “music” — in an ontological sense and not understood in a neuropsychological constructivist way – and the essence of life.

While the theory of quantum consciousness is continuously making progress (Li *et al.*, 2019; Hameroff, 2021), studies exploring (possible) interconnections between quantum field, cognition and music are still rare, but promising. In this context, and Italian research group (Dalla Chiara *et al.*, 2015) highlighted the crucial importance of parallelism, particularly “common features between psychological parallelism and the characteristic parallel structures that arise in quantum theory and in quantum computation”, alongside possible applications of quantum computational semantics to cognitive problems and parallelism in music.

Although still at the level of a medical-physical hypothesis, the author of this article is convinced that the “subatomic third theory” becomes – one day – a key explanation tool for music therapy too.

Cosmic harmony

Basic idea: All existence is united by the same harmonic principles. Losing this harmony means illness. Music is able to re-establish the harmonic connection with the universe

In his paper about historical perspectives on pathogenic music, Kennaway (2015) highlighted that “during the seventeenth and eighteenth centuries, the idea of music as an expression of universal harmony was challenged by a more mechanistic model of nervous stimulation”. This statement not only touches upon the usually underestimated aspect of contraindications in music therapy, it also makes the polarity between holistic philosophies and

neurological foundations of music therapy an urgent subject of discussion.

As regards principles of cosmic harmony in music therapy, such considerations usually involve historical and ethnological perspectives. Gary Ansdell (2015) assumed that this trend partly stems from the continued influence of one of the foundational myths of music therapy, Plato’s *Harmonia* – a theory which portrayed how the cosmic harmony of the spheres influences social harmony in the civic world below. Contemporary versions of this quasi-metaphysical idea still regard social harmony in a sense as pre-determined or granted by the spiritual and healing power of cosmic or universal music. However, this metaphor looks somehow too idealised and top-down as to match scientific standards.

In Western cultures people have become familiar with the (stereotypical) opinion that such explanations are no more than myths in the sense of pseudo-philosophical tales. However, this – in a sense intolerant – conviction can be traced back to positivistic standpoints, while ontological reductionism in whatever form can hardly serve as a robust epistemological argument (of course, also this statement can be criticised as a sort of reductionism). By contrast, interdisciplinary – particularly quantum physical and philosophical-theological – studies have been advocating the re-consideration of holistic perspectives (Huber and Thirring, 2011). These – in a sense revolutionary – views are of crucial importance for innovative ways of understanding efficacy and effects of music therapy. It seems that musicological constructivism is not an adequate means to elucidate the entire functional mechanisms of healing music. In addition to such changes of meta-theoretical paradigms in the realm of music therapy, these new and audacious positions proved to correlate with a multitude of ethnological and spiritual concepts. From an epistemological and science theoretical point of view we have to rethink conventional concepts of truth.

Following the traces of universal harmonic foundations of music therapy leads to a wealth of approaches, which are worth reconsidering from contemporary clinical perspectives, though. In this context, Prins explained how the medieval scholar Marsilio Ficino “united Platonic ideas about the music of the spheres with biblical ideas about the imprint of God’s image on human beings” (Prins, 2006): “I will argue that Ficino’s reconciliation of the *Timaeus* with the book of Genesis allowed for the connection of the ancient doctrines of cosmic harmony and the power of music. This resulted in new possibilities for music therapy.”

While the notion of cosmic harmony has gained ground in various domains such as eco-phenomenology (Dolidze, 2018), these ideas also characterise philosophical foundations of Ancient Oriental Music Therapy and other important traditions of healing music, e.g. in China. Particularly in the area of culturally sensitive music therapy, universal harmony and holistic equilibrium have become essential for the explanation of the power of musical interventions. And yet, interdisciplinary and meta-theoretical considerations are necessary to avoid figments.

Religion and spirituality

Crucial idea: Music is given by God or deities in order to maintain life, to enhance the quality of being, and to provide a medium to connect with the spirits beyond

In 2013 Noah Potvin published his findings that spiritual beliefs of music therapists do not function as a predictor of theoretical orientation. This surprising statement raises questions how individual beliefs and life philosophies, theoretical attitudes in

clinical practice, and epistemological reflections about underlying music therapeutic principles are interrelated. And there are answers which are not consistent with Potvin's standpoint (Watson, 2013). The probably biggest challenge in a widely positivistic oriented Western medical system is how to deal with spirituality and the inner truths of religions. Although religion and spirituality play a big role for medical ethics (Saunders, 2015), as well as the phenomenon of death, they are rarely directly applied to core issues of therapy – some special domains such as palliative medicine (Evangelista *et al.*, 2016) or geriatric oncology (Balducci, 2019) excepted.

By contrast, Sufi mystics (Meymandi, 2010) elucidate how music and movement connect people and God, and Shamans (Singh, 2017) tell us how they “negotiate” with spirits and how their music influences healing processes in a meta-physical way. And although constitutional laws highlight the truth of, e.g., Christianity, the crucial question remains how these truths are understood and whether they are strong enough to tally with medical means and guidelines for clinical responsibility.

Here we do not speak about religion and myths in a theoretical way or as a research object. The question in this context is whether spirits or heavenly powers are the actual root of healing processes. Precisely in the sense of the *Media Vita* we mentioned above: Singing the prayer triggers the divine rescue. Modern worlds tend to separate epistemological credos and the worlds which refer to them. Or the awareness of this polarity encourages a new understanding of truth, which would also impact on music therapeutic theories and philosophies.

Creativity and aesthetics as anthropological constituents

Basic idea: creativity and aesthetic awareness separate individuals from machines and are vital human qualities. Deficient facilities to live creativity and aesthetic experience are pathogenic conditions, hence the music's health promoting and therapeutic potential

Questions about the relationship between music and patients in music therapy are both crucial and most delicate: there are lots of diverse and also conflicting opinions. This is also mirrored by the tension between “Defense of beauty” (Aigen, 2007; 2008) and “Defense of the person” (Smeijsters, 2008) and calls for complex views of music therapy, hence concepts such as Stige's (2008) “multiple aesthetics”.

It goes without saying that creativity and aesthetics play crucial roles in music therapy. By contrast, the therapeutic principles that underlie creative activities and aesthetic experiences are not self-evident. Various approaches tried to elucidate phenomena and to underpin related models. On the basis of Jungian ideas David Rosen (2002) called creativity a means able to heal the soul and to transform suicidal depression. And referring to creativity and public health, Heather Stuckey and Jeremy Nobel (2010) summarised the fundamentals of their meta-analysis: “Through creativity and imagination, we find our identity and our reservoir of healing. The more we understand the relationship between creative expression and healing, the more we will discover the healing power of the arts.” Analogous views appear in the realm of aesthetics and involve the whole spectrum of arts.

Complementing these psychological approaches, ontological and evolutionary perspectives encourage a more audacious dis-

ussion – and self-actualisation as the peak of Maslow's hierarchy of needs (1943, 1962) has to be revisited. Particularly his expanded view of aesthetic and transcendence needs (1970a, 1970b) invigorated interdisciplinary discussions in music therapy. A wealth of observations and experiences suggest that self-actualisation goes hand in hand with the experience of profound identity and the vital essence of life. In artistic therapies such peak experiences are most often inextricably intertwined with creative developments alongside their joyful aesthetic perception. Experiences such as ‘My music is me’ (Amir, 2012) substantiate this viewpoint.

Creativity and aesthetics perform as core principles of life – and are mirrored, symbolised and actualised in music therapy. They point to the inner drive of existence as well as to the aesthetic realisation of being in full harmony with the ontological self. This concept transcends by far Darwin's aesthetic theory of sexual selection (Prum, 2012) and goes beyond a constructivist understanding of creativity. According to various anthropological positions creativity and aesthetics belong to the very essential entities of human existence, hence their need of realisation. Both deprivation and overexertion can provoke pathological reactions, while well balanced creative music therapy showed, e.g., positive effects in premature infants (Haslbeck, 2014).

From a neuro-anthropological perspective, Uhlhaas and Singer (2011) highlighted that “in humans, one characteristic feature of cortical organization is the addition of strategically important areas that serve as nodes for additional interactions between phylogenetically conserved brain regions. These novel processing structures serve multimodal integration and the generation of metarepresentations. The novel cognitive functions that have emerged from this increase in complexity comprise multiperspectivity, creativity, language, and theory of mind.”

Together with the discovery of genetic factors underpinning a musical mind (Ukkola *et al.*, 2009) the present article suggests a multidimensional way of understanding health-related features of creativity and aesthetics in music therapy. Artistic, phenomenological-psychological, anthropological-neurological, genetic and ontological perspectives form a holistic explanatory model that regards creativity as the human driving force of evolution and aesthetic experience as the sensory awareness of the essence of life.

Conclusions

Errare humanum est. Introducing “Objective Knowledge” as a philosophical principle, Karl Popper also emphasised the possibility of failure. Following Seneca's words “*sed in errare perseverare diabolicum*” – but to persist in error is diabolical – this article tries to encourage discussion about music therapeutic developments and truths. The paper contains criticism that has to be understood in its etymological sense: as an act of rational discernment that aims at revelation of truth. Criticism in this article does not mean devaluation. Its only purpose is to contribute to the development of music therapy and the benefit of patients.

The development of artistic, creative and aesthetic therapies needs interdisciplinary collaboration and reflection – the European Academy of Sciences and Arts and its seven classes are an ideal forum. By way of illustration, humanities are dealing with ontology of music and health, medicine studies techniques to reduce symptoms in schizophrenia, the role of the arts is self-evident in arts-based therapies, music as a booster of neuroplasticity or connections between sound and quantum fields relate to natural sci-

ences, community music therapy or legal foundations of arts-based clinical interventions are topics of social sciences, law and economics, technical advices used by patients to compose for self-regulation purposes and improvement of quality of life relate to technical and environmental sciences, and world religions embody spiritual practices of the healing arts. Closer collaboration between creative and aesthetic therapies and the European Academy of Sciences and Arts would greatly enhance this discipline's development alongside benefits for a healthier world.

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