

Music and the Sciences: Introduction

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Musicology, the academic study of music, has always had a distinctly interdisciplinary nature. Strong interaction with the humanities has traditionally included such areas such as literature, arts, history, religion and philosophy. Musicology has likewise been enriched by interdisciplinary contact with the exact and social sciences, notably more so in the last few decades. It has become quite acceptable for computer scientists, mathematicians and cognitive scientists to study aspects of music either within their own disciplines or together with musicologists.

One reason why this has happened is a distinctive change of focus in music research. Music is no longer studied in the first place from a structural viewpoint, as a thing in itself. Instead, human involvement with music is put at the centre of attention. This is evident in the emergence of a strong research tradition in music perception and cognition, and in the recent involvement of the neurosciences. Music as a commodity has stimulated research from the perspectives of computer science and economics. Music as a social phenomenon, even a means to define one's personal identity, has attracted attention from sociology, anthropology and evolutionary biology.

Though it is difficult to come up with an accurate estimate, it is clear that today a significant amount of music research is performed outside musicology. Probably the most important challenge such research faces is to bridge the apparent gap between a quantitative or empirical approach, which leads to generic insights, and the individual appreciation of music as an art and the understanding of the uniqueness of musical works (to use a convenient expression that is somewhat discredited in recent music research).

The latter aspect relates to the hardest questions in music research, which concern music and meaning. Music is obviously meaningful to a very large part of humankind. Yet such meaning is subjective, difficult to express, and hard to relate to measurable musical properties. Consequently, musical meaning was regarded as an illegitimate question in music research for a long time. Yet it relates to the fundamental reasons why we want to study at all. Meaning has therefore come back as a central topic in modern musicology, where it is answered using a variety of postmodern philosophical and culture-critical methods. In the sciences, a considerable amount of knowledge has been gathered about how music functions in the human mind and in society. Such knowledge may also be expected to shed some light on problems relating to musical meaning, for example, what properties play a role in generating it, how it is perceived, stored and communicated to others, how it depends on training, exposure and cultural background and finally the pressing but unsolved question why we have music at all.

The fact that no fewer than 16 contributions were submitted for this issue serves as an indication of the importance, or even urgency, that researchers attach to such interdisciplinary questions about music. From these submissions, six were selected for inclusion. Taken together they present a variety of perspectives on music, yet with many interconnections. Some of these are indicated below.

Karin Bijsterveld and Peter Frank Peters' article *Composing Claims on Musical Instrument Development: A Science and Technology Studies' Contribution* offers an empirical perspective on the study of musical instruments, moving away from the traditional viewpoint that these develop mainly because of new requirements from composers. One of the cases studied by the authors is the 'retro-invention' of musical instruments as part of the quest for authentic performance of early music.

Authenticity re-emerges in Marshall Stoneham, Bastiaan Blomhert, Nessa Glen and Tony Harker's *What Constitutes Proof: Challenges in Wind Harmony Music* as the property of a musical work. The question whether a work has been written by a specific composer is sometimes difficult to answer. This article shows how a data-rich, computational approach can help to unravel the often complex issues surrounding the authorship of musical works from the past.

The digitization of musical notation and audio enables the experience, enjoyment and study of music to be supported by the computer. In *A Multimodal Way of Experiencing and Exploring Music*, Meinard Müller, Michael Clausen, Verena Konz, Sebastian Ewert and Christian Fremerey describe how different performances of the same piece can be synchronized automatically in a playback environment, thus allowing, for example, the detailed study of differences in expressive timing between performers.

Carlo Zuccarini's *Hearing Voices: Neuropsychanalysis and Opera* takes up the question of experience and emotion. By connecting psychology and neuroscience, he offers an explanation of how and why opera is capable of having such a powerful emotional impact on listeners. Peter Vuust and Morten L. Kringelbach delve deeper into neuroscience and music in their article *The Pleasure of Making Sense of Music*, discussing in particular the roles of musical expectancy and the brain's reward system in the enjoyment and meaning of music.

There is however a dark side to musical meaning. In their article *Music and Conflict: Interdisciplinary Perspectives*, Morag Josephine Grant, Ingvill Morlandstø, Rebecca Möllemann, Simone Christine Münz and Cornelia Nuxoll show how music can be exploited in incitement to hate and violence. Distressing though this may be, it illustrates the point that music is not an innocent luxury, but something that makes us who we are and that infuses all aspects of our being.

I would like to thank the Editor of *Interdisciplinary Science Reviews*, Willard McCarty, for inviting me to edit this Special Issue, and for his continuous support during its preparation. For a while, Robyn Braun, formerly Assistant Editor of ISR, also provided valuable help. I owe many thanks to all authors who submitted their work for inclusion. Several interesting submissions could not be included, which will hopefully be published elsewhere. All submitted

contributions were reviewed by two experts in interdisciplinary music studies. They have provided many insightful comments to the authors. Moreover, their combined efforts have made my task of making the final selection much easier. Therefore, my special thanks to the eighteen reviewers, Geoffrey Chew, Tim Crawford, Bruno Gingras, Bas de Haas, Lewis Jones, Peter van Kranenburg, Olivier Lartillot, Micheline Lesaffre, Sabine Lichtenstein, Dirk Moelants, Daniel Müllensiefen, Richard Parncutt, Martin Rohrmeier, Rena Sharon, Eleanor Selfridge-Field, Remco Veltkamp, Henk Visser and Lawrence Zbikowski, for providing this essential but often undervalued service.