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# Computational Music Science

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# Making Musical Time

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*Dedicated to Emilio Lluis-Puebla*



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## Preface

It is time now to talk about time, more precisely: time in music. Why? Because within the complex topic of time, musical time plays a very special role. It is not identified as a type of time, which we encounter in the general existentiality of humans, but reveals a constructive character that transcends the general context and proves also a precise mechanism which represents more than a passive perception of a given ontology as often and typically conceived in physics and the neuroscientific cognitive perspective.

Such a project must first of all deal with the concepts of time which are set forth in overarching contexts of time theories. We are forced to elaborate the musical time reality as a specific expressivity that differs from non-musical ontologies. Such a project has to focus on musical time as a very special form that relates to other conceptualizations, and to elaborate its distinctive and characteristic attributes. But our analysis of time in philosophy, physics, and cognitive sciences reveals a number of important commonalities and roots, which put into evidence a convergence of time concepts, which induce its musical ontology.

This book follows a set of approaches to music theory, and more precisely: mathematical music theory, which include our universal setup as developed in *The Topos of Music* [94, 95, 96, 97], the discourse about gestures in *Flow, Gesture, and Spaces in Free Jazz* [99], the analysis of *Musical Creativity* [101], and the theory of *Musical Performance* [100]. These theories all deal with time, but never set the focus onto analyzing and understanding the in-depth ontology of musical time.

In this book, we now elaborate a temporal ontology of musical time that follows an explicit theory of how musical time is constructed. We contend that *musical time is a construction*, this is our first basic thesis. But we also propose and develop the idea that *musical time is constructed from a sophisticated interaction of musical gestures*. Musical time is presented as a result of a “distributed identity” that appears from a mathematically conceived mechanism involving projective limits of gestural diagrams.

This endeavor is developed not only from the mentioned philosophical, physical, and cognitive perspectives, but also from existing approaches to musical time as developed by well known musicological models. In particular, we analyze Jonathan Kramer's creative concept of a vertical time, which will be embedded in our model that comprises imaginary time, which was proposed by Stephen Hawking and Izak Bars in cosmology.

We then apply our model to several experimental compositional approaches that are being realized by composers Yan Pang, Jordon Goebel, and Chris Rochester. We also acknowledge Renan Madeira's precious comments concerning Merleau-Ponty's perspectives and South-American time cultures.

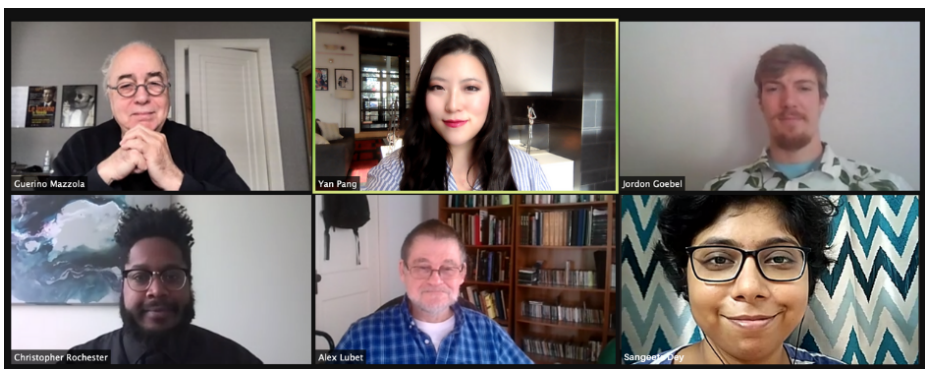
The cultural spectrum of musical time proves the dominance of a gestural genealogy through many important geographic and historical loci. The delicate construction of musical time from its gestural mechanisms is discussed and made evident in a subtle professional analysis of handedness by Alex Lubet in the performance of string instruments. The deep tradition of Asian time cultures is covered beautifully by Yan Pang (Chinese/Japanese approaches) and Sangeeta Dey (Indian approaches).

This book is an interdisciplinary perspective, but a necessary one that makes evident the central role of musical time construction in human existence. Musical time is probably the most human achievement, and we claim that our model sets forth a precise and realistic model of this substantial creation.

We have abstracts for chapters and sections, represented in short "summary" paragraphs. We also add concluding paragraphs at the end of chapters and sections, under the title of "impact", where we connect the contents to other sections or chapters, and, most importantly, draw a vector to the global thesis of this book that musical time is a gesturally embodied construction.

We are pleased to acknowledge the strong support from Springer's science editor Thomas Hempfling for writing such a demanding treatise in covid19 pandemic.

Minneapolis, October 2020



Top left to right, zoom view: Guerino Mazzola, Yan Pang, Jordon Goebel.

Bottom left to right, zoom view: Christopher Rochester, Alex Lubet, Sangeeta Dey.

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