

## **Sessione Tematica preorganizzata**

### **Titolo: ESCOM-Italy. Scienze cognitive e analisi musicale**

#### **Chairs:**

Anna Rita Addessi, Università di Bologna

Nicola di Stefano, CNR, Roma

#### **Abstract**

Questa Sessione è stata proposta da ESCOM-Italy, rappresentante italiana dell'ESCOM-European Society for the Cognitive Sciences of Music ([www.escom-italy.org](http://www.escom-italy.org)), con una doppia finalità: da una parte presentare e discutere nella comunità scientifica alcune recenti ricerche di scienze cognitive della musica connesse all'analisi musicale e, dall'altra, promuovere gli studi italiani in questo settore, essendo questa una delle finalità di ESCOM-Italy. Le relazioni, infatti, sono presentate da ricercatori italiani che hanno prodotto i loro studi in Italia o all'estero. I contributi sono basati su robusti benché differenti approcci metodologici e offrono un panorama ricco e variegato della recente ricerca italiana nelle scienze cognitive e l'analisi musicale.

La discussione cercherà di mettere in luce il potenziale impatto di questi studi nei diversi ambiti applicativi: da quello estetico-interpretativo, a quello performativo, a quello didattico.

Gli autori e i titoli delle relazioni proposte in questa Sessione preorganizzata sono i seguenti:

1. M.M. Venezia, *Analisi percettiva del II movimento della Dance Suite, Sz. 77, di Béla Bartók.*
2. A. Minafra, *L'analisi del linguaggio non-verbale durante il processo di autoriflessione sul movimento tecnico di musicisti professionisti.*
3. G. Cecchetti, S.A. Herff e M.A. Rohrmeier, *Towards an empirical model of structural hearing as processing and representation.*
4. S. Fortuna, *The role of bodily interaction in children's music perception.*

# Perceptual analysis of the II movement of the Dance Suite, Sz. 77, by Béla Bartók

Mauro Maria Venezia

Non-member speaker

The present study was conducted as part of the Perceptual and Cognitive Theories course of the Master's Degree in Music Analysis and Theory at the University of Calabria, Italy. Its aim was to gain a deeper understanding of how music is perceived solely through auditory analysis, without textual reference. Several studies exist in the field: [Addessi and Caterina, 2005], [Imberty, 1989], [Ruwet, 1966], [Deliège, 2001], [Monahan and Carterette, 1985], [Parncutt, 1994].

The aim of the work was to experiment with an on-the-fly analysis to understand the processes and musical structures perceived by the listener. The study was based on the procedure used by Addessi and Caterina (2005) within their research on analysis and perception in post-tonal music. The composer's work was listened to without following the score, memorizing the main parts of the sound material in real time, defining the quality for each part, and identifying the points of division. Subsequently a comparison was made with the text to verify what was perceived auditorily, with new elements added. This was followed by the search for points of division, harmonic-melodic-structural aspects, and perceived accents.

The results of the study proved to be very much in line with Ruwet's principle of segmentation (1966) and with Deliège's concept of reconstructing macroform through "clues" (2001).

Lastly methodological hypothesis were formulated to expand the experiment to various listener types, both musicians and non-musicians, for a broader understanding of real-time music perception and analysis.

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# Analisi percettiva del II movimento della Dance Suite, Sz. 77, di Béla Bartók

Mauro Maria Venezia

Relatore non socio

Lo studio qui presentato è stato svolto nell'ambito del corso di Teorie percettive e cognitive del Master in Analisi e Teoria Musicale dell'Università della Calabria, con l'obiettivo di comprendere più a fondo come la musica viene percepita attraverso l'analisi esclusivamente uditiva, senza il riferimento del testo scritto. Diversi gli studi esistenti nell'ambito: [Addessi e Caterina, 2005], [Imberty, 1989], [Ruwet, 1966], [Deliège, 2001], [Monahan e Carterette, 1985], [Parncutt, 1994].

Obiettivo del lavoro sperimentare un'analisi all'impronta per comprenderne i processi e le strutture musicali percepite dall'ascoltatore. Ci si è basati sulla procedura utilizzata da Addessi e Caterina (2005) all'interno dello studio sull'analisi e la percezione nella musica post-tonale. L'opera del compositore è stata ascoltata senza seguire la partitura, memorizzando le parti principali del materiale sonoro in tempo reale definendone per ciascuna la qualità, e individuando i punti di divisione. Successivamente il confronto con il testo verificando quanto percepito uditivamente, aggiungendo nuovi elementi. In seguito la ricerca di punti di divisione, di aspetti armonico-melodico-strutturali e degli accenti percepiti.

I risultati dello studio si sono rivelati particolarmente in linea col principio di segmentazione di Ruwet (1966) e con quello sulla ricostruzione della macroforma attraverso "indizi" di Deliège (2001).

Sono state infine formulate ipotesi metodologiche con le quali si propone di allargare l'esperimento a più tipologie di ascoltatori, musicisti e non, in modo da avere un quadro ancora più ampio su come la musica venga percepita e analizzata in tempo reale.

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# Analysis of professional musicians' nonverbal language during the self-reflection process on technical movement

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From the embodied cognition [Leman, 2008] perspective, this paper aims to analyse non-verbal language exhibited by professional musicians while self-reflecting on technical movements to develop body self-awareness and its influence on their performance. The embodied cognition theory considers knowledge generated by the body-mind-movement correlation. Both in verbal communication and in playing music, gestures and body movement assist in transmitting meaning. After many years of practicing, gestures are automatised, reducing musicians' mental effort. However, this may bring musicians to unconsciously perform their movements through performative awareness [Gallagher, 2005]. This could be an underlying factor causing tension to develop which negatively affects performance quality and interpretation.

To explore this issue, a qualitative study, based on three case studies, was carried out. Through semi-structured interviews applying a phenomenological approach and through observation and audio-visual materials, data were collected and video-recorded. The three musicians involved in this study, who were part of a larger research project [Minafra, 2019], prior to being interviewed, were asked to choose an easy, slow piece of music and then to perform it three times from memory during the interview. First, the piece was performed with no intervention. Then, musicians were asked to mentally rehearse [Ross, 1985] the piece before playing it again, and finally, they were asked to simulate the movements [Godøy et al., 2006] of playing without their instrument before performing. After each performance, they were asked to describe their feelings, body perceptions, and any possible differences among the performances.

The findings showed that during the second and particularly the third verbalization, musicians executed kinesthetic and simulated gestures that assisted them in formalizing their utterances, were more clearly able to describe their body perceptions in detail, were more involved in musical flow, and were better able to self-evaluate their performances.

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Ross, S. L. (1985). The effectiveness of mental practice in improving the performance of college trombonists. *Journal of Research in Music Education*. 33(4), 221-230. <https://doi.org/10.2307/3345249>

# L'analisi del linguaggio non-verbale durante il processo di autoriflessione sul movimento tecnico di musicisti professionisti

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Questo studio, all'interno del quadro teorico dell'embodied cognition [Leman, 2008], ha l'intento di analizzare il linguaggio non-verbale mostrato durante il processo di autoriflessione sul movimento tecnico in relazione allo sviluppo della consapevolezza corporea e della conseguente influenza sull'esecuzione musicale di musicisti professionisti. La teoria dell'embodied cognition considera la conoscenza come generata dalla correlazione corpo-mente-movimento. Sia nella comunicazione verbale che nell'esecuzione musicale, gesti e movimenti corporei contribuiscono a trasmettere i significati delle parole e a comunicare le intenzioni musicali ed emozioni dei musicisti. I gesti, dopo anni di studio, diventano automatizzati, riducendo lo sforzo mentale. Tuttavia, ciò potrebbe portare i musicisti a eseguire i movimenti inconsapevolmente attraverso una consapevolezza performativa [Gallagher, 2005]. Questo potrebbe favorire lo sviluppo di tensioni muscolari che influirebbero negativamente sulla qualità dell'esecuzione e interpretazione musicale.

Per esplorare questa problematica, è stata svolta una ricerca qualitativa basata su tre studi di caso. I dati sono stati raccolti video-registrando interviste semi-strutturate con un approccio fenomenologico, e attraverso l'utilizzo di osservazione e materiale audio-visivo. Ai tre musicisti coinvolti, partecipanti di un più ampio studio [Minafra, 2019], è stato richiesto di eseguire tre volte a memoria un brano facile e lento, scelto da loro prima dell'intervista. La prima volta, i musicisti hanno eseguito il brano senza alcuna richiesta, prima della seconda esecuzione hanno eseguito la ripetizione mentale [Ross, 1985] e prima della terza, il movimento simulato [Godøy et al., 2006]. Dopo ogni esecuzione con lo strumento, i musicisti hanno riferito le loro percezioni corporee ed eventuali differenze delle esecuzioni.

I risultati mostrano come, durante la seconda e particolarmente durante la terza verbalizzazione, i musicisti hanno eseguito gesti cinestetici e simulati utili per la formalizzazione delle frasi, hanno descritto più dettagliatamente le loro percezioni corporee, sentendosi più coinvolti nel flusso musicale e più capaci di auto-valutare le loro esecuzioni.

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# Towards an empirical model of structural hearing as processing and representation

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From a cognitive perspective, “structural hearing” may be understood as the formation of mental representations of structural relations: crucially, these are not immediately encoded in the musical surface, but have to be *inferred from* the musical surface while listening. Building up on the theoretical proposal by Jackendoff (1991), we present evidence from several recent studies into a tentative model of processing that is consistent with this preliminary empirical foundation.

Specifically, we propose a model of a mental processor that operates based on two kinds of computations (Herff et al., 2023; cf. also Gibson, 1998): it

(1) keeps track of currently open structural relations linking events that have happened in the past with events that may happen in the future.

(2) “merges” newly encountered events into pre-existing partial representations by closing open structural relations and the corresponding expectations.

Additionally, the processor

(3) deals with the coexistence of multiple interpretations by ranking them (e.g., according to their likelihood), and retrospectively updates such ranking as new events are encountered (Cecchetti et al., 2022).

Finally, the processor

(4) Operates automatically and produces representations that are stored in memory and can interfere with the formation of new structural representations (giving rise to structural priming; Cecchetti et al., 2023).

Overall, this approach aims at bridging several phenomenological aspects of real-time musical experience as characterised by music theory and analysis, on one hand, with, on the other hand, cognitively plausible processes in the broader framework of Bayesian cognition. Such an empirically-grounded model of structural processing explicitly accounts for how music continuously manipulates both expectancies towards the future (understood as the projection into the future of incomplete structural relations) as well as memory of the past (through mechanisms of retrospective revision). We discuss implications and limitations of this approach with respect to music-analytical insights on the real-time experience of musical structure.

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# The Role of Bodily Interaction in Children's Music Perception

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Moving to the music is not merely a reactive bodily response to the music, but a means of focusing, selecting, and reinforcing the salient cues of the piece [Leman, 2007].

Within the theoretical framework of *Embodied Music Cognition*, this research investigated how and to what extent a body movement interaction with music could influence the listening process of untrained listeners [Fortuna & Nijs, 2020].

To address this issue, an experimental design was set up with 52 primary school children (ages = 9-10) without formal music education. The participants, divided into two groups attended a verbal-based (describe what you heard in the music, after listening) vs. movement-based intervention (show what you hear in the music, with your body movement, while listening). Before and after the interventions, they were invited to create spontaneous notations of the music and to verbally explain their notations.

The analysis consisted of a mixed, exploratory method. First, a qualitative visual and thematic analysis was performed (e.g., children's notations and interviews). Subsequently, qualitative data were quantified based on a set of classifications to explain their statistical significance (*Wilcoxon Sign Rank* and *Kruskal-Wallis rank test*).

Results revealed a significant increase of notations, from pre to post-test, focused on the description of the salient musical features, among children involved in a bodily music interaction, with a focus on the structural and temporal organization of the piece (e.g., repetitions, variations, identification of melodic profiles). Differently, the participants of the verbal group, showed a tendency, from pre to post-test, to narrative listening through the narrativization of the salient cues detected in the music [Nattiez, 2011].

Outcomes highlight the impact of body movement on being present with the music and the role of kinaesthetic memory in clarifying the temporal dimension of listening.

This study, exploring the role of the body in perceptual music analysis, may give insight into music analysis education.

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Keywords

*Embodied music cognition, spontaneous notations, perceptual musical analysis, temporal dimension*

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