



Analytical Approaches to World Music

Fourth International Conference

Hosted by The New School

June 8–11, 2016

Conference Program

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Dear Colleagues,

Welcome to the Fourth International Conference on Analytical Approaches to World Music (AAWM 2016), hosted by The New School in New York, USA. This is the fourth in a series of conferences that bring together scholars from diverse disciplines and cultures, in order to foster interdisciplinary and cross-cultural dialogue and promote new approaches and methods for the study of world music. This year we are very happy to host two distinguished keynote speakers, a plenary panel, sixty one paper presentations, including three special sessions, nine poster presentations, a lecture-demonstration, a workshop, and three concerts. These contributions examine world musical traditions from many different analytical and theoretical angles, including, but not limited to, ethnographic, historical, formal, computational, and cognitive perspectives. They thus offer a representative cross-section of methodologies and disciplinary affiliations, documenting the increasing attention that world music receives in all areas of music research, including ethnomusicology, music theory and analysis, music history, music psychology, and music information retrieval. We are very glad to see that this conference series continues to grow since its original inception in 2010.

This year's AAWM conference is hosted by The New School and co-sponsored by The New School, New York University, and The University of British Columbia. We extend our thanks to our sponsors for making this event possible. We would also like to thank all the organizers involved in the making of this conference. Special thanks to our program committee, an international team of fifty two experts, who reviewed the submissions and helped ensure the highest scientific standards.

Finally, it is with great sadness that we share the news of Rob Schultz's passing on May 22, 2016. Rob was a vibrant young scholar and a beloved colleague and friend. He was a co-founder of our conference series and associated journal *Analytical Approaches to World Music*. We will miss him dearly. This conference is dedicated to his memory.

Panayotis Mavromatis

Program Co-Chair

Chris Stover

Local Arrangements Chair

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The Rob Schultz Junior Scholar Award

It was with tremendous sadness that we received word in May regarding the passing of our fellow scholar, colleague, and dear friend Rob Schultz. In addition to his teaching and research activities at the University of Kentucky, Rob was co-founder of the *Analytical Approaches to World Music* journal and the associated conference series. We will miss him dearly and are grateful to have had the opportunity to share these activities with him. We are proud to dedicate the AAWM 2016 conference to his memory.

Working in close association with Rob's family, the editors and organizers of the *Analytical Approaches to World Music* (AAWM) journal and conference series have recently established the Rob Schultz Junior Scholar Award to honor our dear friend and colleague.

The award is open to graduate students and young scholars within five years of graduation and is awarded on a biennial basis as part of the AAWM conference series. For each conference, the best paper presented by a junior scholar will be selected for publication in the AAWM journal, and the author will also receive a modest cash award.

The competition will be adjudicated by a committee of AAWM editors and organizers in association with The Schultz Family. The committee will nominate candidates to receive the award subject to approval by representatives of The Schultz Family who will notify the winner and grant the award. The Bove Family Foundation has generously offered to endow the award with regular donations of \$750 in addition to those donations received through AAWM.

Those AAWM conference presenters interested in applying for the award may forward submissions to AAWMjournal@gmail.com. Specify 'Rob Schultz Junior Scholar Award' in the subject line. Formatting and other requirements are the same as for submissions to the AAWM journal, all of which can be found at

<http://www.aawmjournal.com/guidelines.htm>.

To fund this award in Rob's memory, AAWM is accepting donations at:

<https://www.generosity.com/fundraisers/rob-schultz-junior-scholar-award/>

If you are able, please donate whatever amount feels comfortable. Any donations we receive will be used to continue this award for as long as possible.

CONCERTS

Thursday, June 9, 7:30 pm—Location: Fifth Floor Performance Space

Sacred Harp Singing Demonstration and Workshop

Sacred Harp singing is participatory, a cappella singing that takes its name from *The Sacred Harp*, a book of sacred choral music that has been continuously in print since 1844. This living tradition is unlike any other form of American music both in its vibrant sound and in its distinctive singing practice. Although it was once widespread, shape-note music was sung continuously only in the South until the practice experienced a revival in the 1960s, when it expanded across the US and to several other countries. This presentation combines a demonstration of traditional practice, in which singers sit in a "hollow square" formation and take turns leading (conducting) songs from *The Sacred Harp*, with a participatory workshop. All are welcome and books will be provided.

Five AAWM conference presenters are experienced Sacred Harp singers: **Jesse P. Karlsberg** (Emory University) is the vice president of the Sacred Harp Publishing Company and edits the Sacred Harp Publishing Company Newsletter. **Ian Quinn** (Yale University) organizes the New Haven Sacred Harp group. **Rachel Hall** (Saint Joseph's University) is a co-author of *The Shenandoah Harmony*, a new shape-note book. **Nikos Pappas** (University of Alabama) is a singer and award-winning fiddler in the American old time tradition. **Mark T. Godfrey** (Shred Video, Inc.) has programmed the FaSoLa Minutes app designed for the Sacred Harp community.

They are joined by **The New York City Sacred Harp Singers**, who write, "Come sing Sacred Harp in New York City! Sacred Harp is a vibrant, living tradition of American sacred choral music, sung a cappella. With roots that stretch back over 200 years, Sacred Harp is inclusive, participatory, and open to all comers—regardless of musical ability—and people of all faiths and backgrounds are welcome. Details about our local events are available at: nysacredharp.org. You can also visit the NYC Sacred Harp Facebook group, or write to us at nysacredharp@gmail.com for more info. Come sing with us!

Friday, June 10, 8:00 pm—Location: Fifth Floor Performance Space

Richard Boukas Quarteto Moderno

Richard Boukas, composer-guitarist-vocalist and internationally recognized purveyor of Brazilian music, presents his Brazilian jazz ensemble **Quarteto Moderno** in a performance of ten original compositions (eight premieres). Genres represented include samba, choro, baião, frêvo, marcha, and valsa. Boukas is joined by: Lucas Pino (woodwinds), Gustavo Amarante (bass) and Maurício Zottarelli (drums). Friday, June 10, 7:30pm, Jazz Performance Space.

For official conference page and to download program notes, visit www.Boukas.com.

Reception Music

Wednesday, June 8th, 6:00 pm

Zan Tetickovic Trio: Ismail Lumanovski (clarinet), Martin Doykin (bass), Zan Tetickovic (drums)

2016 Conference Schedule

Wednesday, June 8

9:00 am - 12:00 Session 1a: World Music in Composition (*Stiefel Hall*)

Chair: Martin Scherzinger

Steve Reich and Balinese Gamelan

Michael Tenzer

Trans-Cultural-Stylistic Solutions of Toshi Ichianagi's *Transfiguration of the Moon* (1988), for *Shô* and Violin

Joshua Banks Mailman

Speaking a Hybrid Language in Chinese Electroacoustic Music

Yinuo Yang

Two-Voice Frameworks and the Harmonization of Indian Ragas

Robert Morris

9:00 am - 12:00 Session 1b: Formulaic Systems, Orality, Improvisation (*Glass Box*)

Chair: Richard Widdess

Giant Steps and *Dreydlekh*: Formulaic Improvisation, Ornamentation and Cyclical Forms in Klezmer and Jazz

Michael Anklewicz

Melodic Stability and Memory Analysis in Semi-Oral Chant Traditions: A Computational Study of *Qur'an* Recitation and *Torah* Trope

Dániel Péter Biró, Peter van Kranenburg, George Tzanetakis

Melodic Structures and Modal Development of *Malḥūn* Sung Poetry in Morocco

Christopher Witulski

Towards Understanding Options and Rules for Singing Chinese Verse in Early Japan

Elizabeth Markham

12:00 - 1:00 pm Lunch

1:00 - 1:30 pm Poster Session 1 (see p. 17) (*Theresa Lang Center*)

1:30 - 4:30 pm Session 2a: Rhythmic Complexity and Interaction (*Stiefel Hall*)

Chair: Martin Clayton

Formative Processes of Durational Projection in “Free Rhythm” World Music

John Roeder

How West African Drummers Keep in Time Together: Musical Roles and Individual Behavior in Ensemble Entrainment in Jembe Music from Mali

Rainer Polak, Nori Jacoby, Justin London

Microtiming in the Rhythmic Structure of Candombe Drumming Patterns

Luis Jure, Martín Rocamora

Experimentations with Timelines in Afro-Bahian Jazz: A Strategy of Rhythm Complexity

Juan Diego Diaz

1:30 - 3:45 pm Session 2b: East Asia (*Glass Box*)

Chair: Rafael Caro Repetto

Melodic Transformation Processes in the Arrangements of *Jingju* Banshi

Rafael Caro Repetto, Xavier Serra

Voices from an Unsealed ‘Time Capsule’: Decoding the Vocal Styles in Okinawan Folksong Singing by Argentinian-Uchinanchu

Wan Huang

The Renaissance of *Tang Zheng*: Reappropriations of Classical *Zheng* in Modern *Zheng* Culture

Yuan-Rong Wu

3:45 - 6:00 pm Session 3a: Polyphony (*Glass Box*)

Chair: John Roeder

Epirus Polyphonic Singing and GTTM Analysis: Issues of Prolongation, Hierarchy and Modal Pitch Space

Costas Tsougras

Structural Analyses of Poly-Ensemble Music of the Asante of Ghana

Joseph Kaminski

A Counterpoint for Catching a Tiger

Anton Vishio

4:30 - 6:00 pm Session 3b: Central Asia (*Stiefel Hall*)

Chair: Jay Rahn

Traditional *Ladakhi* Songs: A Study in Textual, Melodic, and Rhythmic Hybridity

Noe Dinnerstein

Theoretical Music Treatises in the Fifteenth Century Timurid Music: an Analysis of Benâî's
"Risâle-i Mûsikî"

Zeynep Yıldız Abbasoglu

6:00 pm Reception (*Theresa Lang Center*)

Live music provided by the Zan Tetickovic Trio

Ismail Lumanovski (clarinet), Martin Doykin (bass), Zan Tetickovic (drums)

Thursday, June 9

9:00 am - 12:00 Special Session: Analysis and Ethnography (*Stiefel Hall*)

Chair and Respondent, Michael Tenzer

Analytical Stories, Ethnography, and Cultural Values

Yonatan Malin

Mimicry as Movement Analysis?

Rosa Abrahams

Conception and Performance of Meter in Bulgarian Folk Music

Daniel Goldberg

Contextual Theory, or Theorizing between the Discursive and the Material

Chris Stover

Response by Michael Tenzer, followed by discussion

9:00 am - 12:00 Session 4b: Indian Rhythm (*Glass Box*)

Chair: Peter Manuel

Entrainment and Interaction in Indian Music

Martin Clayton

Rethinking the Tabla Solo

Vivek Virani

Analysis-by-Synthesis of Rhythm in South Indian art Percussion Performances by Means of Statistical Analysis

Konstantinos Trochidis, Carlos Guedes, Andre Holzapfel, Akshay Anantapadmanabhan, Andrija Klaric

Theorizing Trikāla: a Generalized Intervallic Approach to Pulse Transformation in South Indian Carnatic Music

Robert Wells

12:00 - 1:00 pm Lunch

1:00 - 2:30 pm Keynote 1 (*Theresa Lang Center*)

Richard Widdess, *Analysing ālāp: Historical, Cognitive and Linguistic Approaches to Indian Music*

2:30 - 3:00 pm Coffee Break (*Theresa Lang Center*)

Poster Session 2 (see p. 17) (*Theresa Lang Center*)

3:00 - 6:00 pm Special Session: Analysis of Large Datasets in American Vernacular Religious Music (*Stiefel Hall*)

Chair: Rachel Hall

Correlations Between the Formal Characteristics of Trans-Atlantic Folk Hymns and Cultural Expression

Nikos Pappas

Settings of the Anglo-American Folk Hymn *BOURBON*, 1814-1902

Rachel Hall

Mapping Musical Taste in the Sacred Harp Community

Ian Quinn

Assessing Tempo in Practice: Analyzing the Correspondence of Sacred Harp Tempos to Historical Guidelines Using a Tempo Estimator

Jesse P. Karlsberg, Mark T. Godfrey

3:00 - 6:00 pm Session 5b: Cuba (*Glass Box*)

Chair: Chris Stover

Improvisations of a Quinto Player: Tone, Time, and Motive in Rumba's Lead Drum

Fernando Benadon, Andrew McGraw

Lines of Influence: Musical Transcription as Revelatory Tool

Sue Miller

The Complex Plane for Visualizing Quantitative Effects of Phase Interpretation on Inferred Clave Using Several Measures of Syncopation

Mehmet Vurkaç

Queer Bolero: Bolero Music as an Emotional Space Among Gay Men in Special-Period Cuba

Moshe Morad

6:00 - 7:30 pm Dinner

7:30 pm Sacred Harp Singing Demonstration and Workshop (*Fifth Floor Performance Space*)

The New York City Sacred Harp

Friday, June 10

9:00 am - 12:00 **Current Trends in Spectral Analysis: A Panel in Honor of Robert Cogan (Stiefel Hall)**

Chairs: Lawrence Shuster and John Latartara

Seismic Melody/Spectral Sorrow: Simbongsa's Lamentation for Kwaak-ssi from the Pansori epic *Simchung-ga*

Jon Sakata

Khap, Timbre, and the Non-Lexical Vocabale

John Latartara

Analyzing Sonic Design in Central Asian Multiphonic Throat Singing: Spectral Sets, Transformations, and Morphologies

Lawrence Shuster

Synthetic Climates and the (re)Presentation of Japanese Acoustic Ecologies

Michael Gardiner

9:00 am - 12:00 **Session 6b: From Turkey to Central Asia (Glass Box)**

Chair: Stephen Blum

New Performance Approaches to Urban *Bağlama* Music: Theoretical Suggestions Towards Traditional *Şelpe* Techniques of *Bağlama*

Ahmet Ozan Baysal, Sinan Ayyıldız

Exploring Motivic Features for Understanding Modal Structure: The Case of Seventeenth-Century Turkish Vocal Songs

M. Emin Soydaş

Principles of Transmission and Collective Composition in Turkmen *Dutar* Performance

David Fossum

Lecture-Demonstration: The Analysis of Microtones in Ottoman/Turkish *Maqam* Music and Creating a Repertoire on Adjustable Microtonal Guitar

Tolgahan Cogulu

12:00 - 1:00 pm **Lunch**

1:00 - 2:30 pm Keynote 2 (Theresa Lang Center)

Jay Rahn, Coordinating Analyses of Tunings with Analyses of Pieces

2:30 - 3:00 pm Coffee Break (Theresa Lang Center)

Poster Session 3 (see p. 17) (Theresa Lang Center)

3:00 - 4:30 pm Session 7a: World Music in Popular Idioms (Stiefel Hall)

Chair: Ellen Koskoff

Blending *Katajjaq* and Electronic Dance Music in Tanya Tagaq's "Uja"

Robin Attas

Pure Folk Metal: Hybridization of Musical Styles in Folk Metal Band Eluveitie

Milena Schaller

3:00 - 4:30 pm Workshop (Glass Box)

Using a Computer to Transcribe Monophonic Melodies: An Introduction to Praat Speech Analysis Software

Aaron Pettigrew

In preparation for the workshop, please visit <http://aaronpettigrew.com/files/aawm/> for downloads of software and sample files.

4:30 - 6:30 pm Plenary Session: World Music Analysis in Music Scholarship Today (Theresa Lang Center)

Panelists: Stephen Blum, Poundie Burstein, Robert Cogan, Ellen Koskoff, Peter Manuel, Martin Scherzinger, Gabriel Solis, Godfried Toussaint

Panayotis Mavromatis and Lawrence Shuster, Moderators

6:30 - 7:30 pm Dinner

7:30 pm Concert: Richard Boukas Quarteto Moderno (Fifth Floor Performance Space)

Richard Boukas (guitar and voice), Lucas Pino (saxophone), Gustavo Amarante (bass), Mauricio Zottarelli (drums)

Saturday, June 11

9:00 - 10:30 am Session 8a: African Rhythm (*Stiefel Hall*)

Chair: Richard Cohn

Healing on the Margins: Rhythm and Repetition in Gnawa Music

Maisie Sum

Collaborative Timelines: Metric Identity in Malinke Dance Drumming

Tiffany Nicely

9:00 - 10:30 am Session 8b: Indian Pitch Structures (*Room 750*)

Chair: Somangshu Mukherji

Towards a Theory of Formal Functions for North Indian Classical Music

Somangshu Mukherji

A Comparative Study of the Impact of Different *Gamakas* on the Structure of the Mohanam Varnam, "Ninnu-kori": Investigating the *Gamaka* Box Notation System

Jeremy Woodruff

10:30 - 12:45 pm Session 9a: Africa (*Stiefel Hall*)

Chair: David Racanelli

Pitch and Tuning in Beninese Brass Bands

Lyndsey Marie Hoh

Revisiting the Katanga Guitar Style(s) and the Origins of African Guitar Music

David Racanelli

Learning Oliver Mtukudzi's "Tuku Music" through Modular Loops

Matthew Hough

10:30 - 12:45 pm Session 9b: Statistical and Corpus Approaches (*Room 750*)

Chair: Panayotis Mavromatis

Some Statistical Properties of Harmony and Voice Leading in *Shemokmedi* School Georgian Chant

Matthew Arndt

“There’s Gold in Them There Hills!,” or Mining for Drum Patterns: Computational Analysis of Balinese *Kendang Arja* Improvisation

Leslie Tilley

Automatic Detection of Outliers in World Music Collections

Maria Panteli, Emmanouil Benetos, Simon Dixon

12:45 - 1:45 pm Lunch

1:45 - 4:00 pm Session 10a: Dance and Embodiment (*Stiefel Hall*)

Chair: Gabriel Solis

Analyzing Traditional Hungarian Dance and Music: Developing a Framework from the Needs of Performance

Judith E. Olson

Embodied Performative Knowledge as Crucial Analytical Tool

T. M. Scruggs

Ojú l'òròḡ wà (meaning is in the eyes): The Role of Gaze in Oríkì Performance

Aaron Carter-Ényì, David Aina, Quintina Carter-Ényì

1:45 - 4:00 pm Session 10b: Comparative and Phylogenetic Approaches (*Room 750*)

Chair: Godfried Toussaint

After All, It Was About Music! Discovering Flamenco Genetics through a Pulse-Level Analysis

Bernat Jiménez de Cisneros Puig

The Evolution of Musical Gabonese Heritage: A Musical Phylogenetic Approach

Sylvie Le Bomin, Evelyne Heyer, Guillaume Lecointre

Measuring the Perceptual Similarity of Middle-Eastern Rhythms: A Cross-Cultural Empirical Study

Godfried Toussaint

Poster Sessions (*Theresa Lang Center*)

Wednesday, June 8, 1:00 – 1:30 pm

Thursday, June 9, 2:30 – 3:00 pm

Friday, June 10, 2:30 – 3:00 pm

In addition to these dedicated times, posters will be on display from 12:00 to 6:00 pm Wednesday, Thursday, and Friday.

A Simple Overview of Musics throughout Gabon

Jeremy Gardent, Sylvie Le Bomin

Improvisation as Rhetoric within John Coltrane's Impressions

Jeremy Grall

Hypothesis of Polymetric Structures in Afro-Brazilian Music

Gérald Guillot

A Flexible Conception of Meter in Pacific Northwest Coast Aboriginal Music

Kristi Hardman

The Significance of the Acoustic Signature in Chinese Narrative Performance: New Discoveries through Praat Acoustic Analysis Software

Francesca Lawson, Shawn Nissen

Kete: Ashanti Royal Court Drumming from Ghana

Ben Paulding

Mathematical Thought and Zoomorphism in the Rhythmic Practice of Carnatic Percussion Performance

N. Scott Robinson

Rhythmic Analysis of Carnatic Style Percussive Music Using an Adaptive Time Domain Decomposition Method

Konstantinos Trochidis, Carlos Guedes

Comparative Study of Musical Gestures and Corporeality: The Case of Long-Necked Lutes in Iran and Central Asia

Farrokh Vahabzadeh

ABSTRACTS

Keynote Addresses

Coordinating Analyses of Tunings with Analyses of Pieces

Jay Rahn (York University, Canada)

Analyses of tunings have often been carried out independently of pieces in which they are actually realized. Whereas tunings are *prima facie* relevant to pieces in which they occur, to what extent is this so? And does such a relationship hold in both directions? That is, are analyses of pieces relevant to analyses of their tunings?

Both sorts of analysis involve methodological problems and, at least in principle, both sorts of analysis should mesh. Germane to the present discussion are instances of such analytical problems that arise in Central Javanese *pélog* tunings and in ‘skeletal melodies’ (*balungans*) of multi-section pieces (*gendhings*) that employ these tunings.

The present account identifies such problems and proposes solutions that attempt to coordinate both sorts of analysis. With regard to tuning *per se*, relationships among acoustical spectra, pitch determinacy, interval categorization, and ‘errant tones’ are considered. Concerning individual pieces, both jointly and severally, longstanding notions about ‘exchange,’ ‘alternate,’ or ‘substitute’ tones (*sorogan*), modal identity (*pathet*), and cadential (gong) tones are addressed.

Linking both kinds of analysis—and shared by both—is an amplified formulation of Wertheimer’s Gestalt Grouping Principle of Similarity. Introduced from post-tonal analysis of European-derived music are concepts of common tones, ‘well-formed’ (WF) scales, and interval vectors.

Analysing *ālāp*: Historical, Cognitive and Linguistic Approaches to Indian Music

Richard Widdess (SOAS University of London, United Kingdom)

The practice of *ālāpa* (lit. “conversation, discourse”), that is, the melodic exposition of a *rāga* in Indian classical music, is described in historical sources since the 13th century, and continues to be an essential constituent of performance in both North and South Indian (Hindustani and Karnatik) musical traditions today (as *ālāp* and *ālāpana*). The term suggests an analogy with spoken language, which it resembles in being a solo, semi-improvised, and non-metrical communicative performance. I will interrogate this analogy with reference to indigenous theory, early notated examples and modern performance practice, and with the help of schemas and recursive syntax.

Plenary Session

World Music Analysis in Music Scholarship Today

World music traditions are receiving increasing attention in all areas of music scholarship, including ethnomusicology, music theory and analysis, music history, music psychology, and music information retrieval. Over the last several years, the mission of our conference and associated journal has been to bring together scholars from diverse disciplines and cultures, in order to foster interdisciplinary and cross-cultural dialogue and promote new approaches and methods for the study of world music. This panel examines the analytical exploration of world music traditions over the past few years in order to acknowledge and appreciate past accomplishments, identify present opportunities and challenges, and reflect on future possibilities.

Panelists:

Stephen Blum (CUNY Graduate Center, USA)

Poundie Burstein (CUNY Hunter College and The Graduate Center, USA)

Robert Cogan (New England Conservatory, USA)

Ellen Koskoff (Eastman School of Music, University of Rochester, USA)

Peter Manuel (CUNY John Jay College and the Graduate Center, USA)

Martin Scherzinger (New York University, USA)

Gabriel Solis (University of Illinois, USA)

Godfried Toussaint (New York University, Abu Dhabi, United Arab Emirates)

Moderators:

Panayotis Mavromatis (New York University, USA)

Lawrence Shuster (Purchase College, SUNY, USA)

Paper Presentations

Giant Steps and *Dreydlekh*: Formulaic Improvisation, Ornamentation and Cyclical Forms in Klezmer and Jazz

Michael Anklewicz (Royal Conservatory of Music, Canada) [Session 1b]

This paper examines commonalities in musical philosophies of improvisation and formal structure between jazz and klezmer musics. Originating on different continents, klezmer and jazz have vastly different histories despite sharing some important musical philosophies which have yet to be explored in the academic literature. This paper delves into the performative and philosophical commonalities between historical klezmer ornamentation and formulaic jazz improvisation focusing on cyclical forms and the use of formulae for improvisation.

In klezmer circles, the ornaments that adorn melodies are called *dreydlekh*, from the Yiddish word *dreyen*, “to turn.” These “turns” can be interpreted in two ways, both of which bear a striking resemblance to concepts of formulaic improvisation in jazz, which, in this paper, will be represented by John Coltrane’s improvisation on his composition “Giant Steps.” The first “turn” is represented by “turning around a melody” using improvisation and ornamentation while the second refers to both musics’ cyclical forms. This paper draws from literature published both in the fields of jazz and klezmer as well as my own 15 years of performance, analysis and fieldwork in klezmer to examine the commonalities between the philosophies of both musical systems.

Some Statistical Properties of Harmony and Voice Leading in *Shemokmedi* School Georgian Chant

Matthew Arndt (University of Iowa, USA) [Session 9b]

Georgian sacred polyphony is stunningly beautiful and has prompted many questions about its harmonic and voice-leading properties. These questions are complicated by our access to the tradition entirely through Western transcriptions from the turn of the twentieth century and a handful of sound recordings. Some have posited diatonic modes in Georgian sacred and folk music. Whether such modes are even conceivable depends on the tuning system, which is a matter of dispute. Some have theorized a traditional Georgian tuning system with unequal steps, while others have posited one with equal steps or constantly changing steps. To address the question of modes and indirectly the question of tuning, I analyzed statistical properties of harmony and voice leading in a collection of *Shemokmedi* School Georgian chant as sung by Dmitri Patarava. This preliminary study found no clear differences between passages with different bass or tenor finals and thus no support for the hypothesis of modes. But the passages shared suggestive, systematic patterns of melodic and harmonic tendencies. These patterns provide indirect support for a system of equal steps.

Blending *Katajjaq* and Electronic Dance Music in Tanya Tagaq’s “Uja”

Robin Attas (Elon University, USA) [Session 7a]

Canadian singer-songwriter Tanya Tagaq employs a solo adaptation of the Inuit throat-game duet *katajjaq* in her musical style, fusing the vocal techniques of her traditional culture with elements of electronic dance music (EDM) and experimental pop. This paper explores how Tagaq’s adaptation both preserves and modifies the periodic rhythmic structures of *katajjaq* through close analysis of “Uja” from her 2014 album *Animism*.

In “Uja,” a 4/4 meter is established with percussion instruments, and vocal parts complement rather than contradict this meter. Even in isolation, the vocal parts would suggest a periodic meter rather than freer (but still periodic) improvisation. The overall formal structure also reflects the norms of EDM, as the textural density process follows typical structures in that genre. However, in other songs, Tagaq’s *katajjaq* does reflect an improvisatory attitude, and other instrumental parts embrace this aesthetic. Similarly, in her live performances of “Uja,” improvisation in both vocals and instrumentation is plain, and the EDM structures mostly absent, leading one to question what musical elements truly constitute the song itself. Perhaps, like the cultural practice that inspires her, Tagaq is more interested in the game of music-making, rather than in fixing a particular song in our collective memories.

New Performance Approaches to Urban *Bağlama* Music: Theoretical Suggestions Towards Traditional *Şelpe* Techniques of *Bağlama*

Ahmet Ozan Baysal (Istanbul Technical University, Turkey) and Sinan Ayyıldız (Istanbul Technical University, Turkey) [Session 6b]

The *bağlama* is one of the most common lute type instruments of Anatolian folk music heritage whose historical background extends back thousands of years. In last twenty years, performing techniques of the *bağlama* without plectrum, commonly called *şelpe*, which had been forgotten during the Republic era, have come to fore in urban society in Turkey. Since the 1990s, under the influence of the changing musical atmosphere of Turkish folk music performance, the historical *şelpe* tradition has evolved and dramatically changed in terms of a synthesis of Westernization and traditionalism.

With all these changes and developments in urban *bağlama* music of Turkey, one may approach the *bağlama* and *şelpe* techniques in a context of a hybrid theoretical method, mirroring the hybrid and “new” music tradition flourishing in cities. In this new hybrid theoretical method, Western instrumentation, such as the guitar and the piano, and the traditional theoretical approaches of the *bağlama* can be combined in one original theoretical method that belongs to urban *bağlama* music and its *şelpe* techniques.

Our study investigates a new instrumentation method for *şelpe* techniques, which could follow and reflect the *bağlama/şelpe* music of today.

Improvisations of a Quinto Player: Tone, Time, and Motive in Rumba’s Lead Drum

Fernando Benadon (American University, USA) and Andrew McGraw (University of Richmond, USA) [Session 5b]

In Afro-Cuban ensemble drumming, recurring composite rhythms are often formed by the layering of individual ostinatos. The most variation is heard in the lead conga drum (the quinto), whose improvisatory phrasing features motivic variants, contrametric accents, and frequent departures from cyclical patterns (Peñalosa 2010). Indeed, quinto players often display astonishing rhythmic invention (Stover 2009). In this presentation, we examine quinto improvisations in three rumba recordings (*Guaguancó*, *Yambú*, and *Columbia*), focusing on the lead drummer’s motivic manipulations. The recordings, which were made in Cuba by one of the co-authors, used contact microphones in a multi-track setup to isolate the details of each percussion part. This allowed us to zero in on the details of the quinto while assessing the interrelationships among players in the ensemble. Our analyses illustrate how the quinto’s transformations of various motives enrich the already complex and loosely isochronous contrapuntal web formed by the other instruments. Taking ghost tones and timbre contrasts into account results in a detailed and integrated picture of the quinto’s rhythmic phrasing.

Melodic Stability and Memory Analysis in Semi-Oral Chant Traditions: A Computational Study of *Qur'an* Recitation and Torah Trope

Dániel Péter Biró (University of Victoria, Canada), Peter van Kranenburg (Meertens Institute, Netherlands), and George Tzanetakis (University of Victoria, Canada) [Session 1b]

We have been devising transcription methods of oral traditions via computational means based on research conducted over an eight-year period. In particular, we have developed new computational models for analyzing chant with twenty-first century technology, thereby continuing the project of folk music transcription initiated by Béla Bartók (1881-1945). In analyzing relationships between parameters of pitch, melodic gesture and melodic scale in examples of Hungarian laments, Jewish Torah cantillation and *Qur'an* recitation with computational tools we have also created a new paradigm for chant transcription by enriching traditional transcription techniques with results from computational analysis based on pitch histograms. In the present study, we have recorded examples of Torah trope and *Qur'an* recitation from specific reciters, analyzing parameters of pitch, melodic gesture, scales and *maqamat* both within and also across traditions. Over a four-year period we have returned to these reciters, asking them to recite the same text passage several times. We thereby aim to better understand the functionality of melodic stability within semi-oral chant traditions and how this relates to the short- and long term-memory of given reciters and religious communities.

Melodic Transformation Processes in the Arrangements of *Jingju Banshi*

Rafael Caro Repetto (Music Technology Group, Universitat Pompeu Fabra, Barcelona, Spain) and Xavier Serra (Music Technology Group, Universitat Pompeu Fabra, Barcelona, Spain) [Session 2b]

Music in *jingju* (also known as Peking or Beijing opera) is predefined by tradition. Before the appearance of *jingju* music composers, actors used to “arrange melodies” (*bianqu*) for new lyrics according to melodic systems called *shengqiang*. Each *shengqiang* consists in a distinctive melodic framework which is transformed rhythmically into predefined metrical patterns called *banshi* to convey different emotions. If this is common knowledge in musicological literature and among performers, an analysis of how this melodic material is transformed is still to be undertaken. In this paper we present a preliminary approach to this topic, by implementing a computer aided comparative analysis. To this aim, we focus on three *banshi* in the *xipi shengqiang* as sang by the *dan* role-type, namely *yuanban*, which is considered to convey the “original” melody, *manban*, obtained by stretching *yuanban*, and *kuaiban*, a compression of *yuanban*. In order to ensure representativeness, we have gathered those arias quoted as example in several *jingju* music textbooks to build our dataset. We obtain a representation of the underlying melodic structure by comparing *yuanban* arias, search for trends in its transformation processes towards *manban* and *kuaiban*, and complement these results with statistical information computed from scores using the Music21 toolkit.

Ojú l'òròṣ wà (Meaning is in the Eyes): The Role of Gaze in *Oríkì* Performance

Aaron Carter-Ényì (Ohio State University, USA), David Aina (Lagos State University, Nigeria), and Quintina Carter-Ényì (Independent Scholar, USA) [Session 10a]

Living traditions of praise-singing are found throughout sub-Saharan Africa, bridging orality, literacy, digital media and the Internet. This paper focuses on the role of gaze in *Yorùbá* praise singing, called *oríkì*, but also draws comparisons to other cultures in Nigeria, as well as Ethiopia, Kenya and South Africa. The *Yorùbá* proverb *ojù l'òròṣ wà* suggests the meaning of one's words is in the eyes. In Western music, mutual gaze between performer and audience increases appreciation by the audience (Antonietti 2009) and eye contact between performers is an important cue (Sawase 2014). In *oríkì*, gaze plays a crucial role in the persuasive powers of the praise-singer: building reputation of

businesspeople or politicians, or increasing loyalty and devotion to a king or god. Mutual gaze (eye contact) between singer and addressee intensifies the experience for both, providing focus for the singer and increasing the “head-swelling” effect of the praise on the addressee (including frisson). The face-gaze (head and body direction) of the praise-singer directs the attention of those present, reinforcing the impact of the words, making the addressee the “cynosure of all eyes” (Barber 1990: 201). Similar to Clayton (2008), analyses presented in this paper present a multi-dimensional coding of sound and movement.

Entrainment and Interaction in Indian Music

Martin Clayton (Durham University, United Kingdom) [Session 4b]

The last decade has seen significant advances in the theory of entrainment (i.e. the mechanism underlying temporal coordination) and its application to music research: this theory has also been a vital element in the study of musical interaction and joint action. As music cognition research looks increasingly at processes of interaction and coordination and the cognitive capacities that underpin them, ethnography has a vital complementary function in focusing attention on the wider social and cultural significance of these processes. This paper builds on recent analyses to ask how an entrainment-centred analysis of a performance of North Indian classical (*raga*) music can be constructed: that is, how a performance can be interpreted in terms of the establishment, variation and disruption of coordination between individual participants.

Experimentations with Timelines in Afro-Bahian Jazz: A Strategy of Rhythm Complexity

Juan Diego Diaz (University of Ghana, Ghana) [Session 2a]

Orkestra Rumpilezz is a big band from Bahia (Brazil) combining jazz with Afro-Bahian instruments and patterns, particularly from *candomblé* and carnival ensembles. Founded in 2006, the orchestra proclaims itself as a dignifier of Afro-Bahian music and has a public rhetoric that emphasizes rhythm complexity in their arrangements and in their local sources. This rhetoric is supported by public explanations of how timelines function as organizers of African derived musics and of Rumpilezz’s own arrangements. How are these public statements reflected in the orchestra’s arrangements?

This paper documents and discusses how Orkestra Rumpilezz experiments with timelines drawn from Candomblé and carnival music in their arrangements and discusses aspects of their rhythmic complexity. Experimentations include cutting or shifting the regulative time point of traditional timelines, or using two timelines in the same piece, sometimes in sequence and others simultaneously. Rhythmic complexity is measured using perceptual, metric and performance parameters and examining familiarity, expectations and metric dissonance (per Toussaint 2013). I frame the composer’s experimentations with timelines as a strategy to increase rhythmic complexity and ultimately to elevate Afro-Bahian music. This work engages contemporary scholarship on timelines (Toussaint 2013, Stover 2009) and contributes to the study of timelines in Brazil, more specifically timeline function in non-conventional timelines.

Traditional *Ladakhi* Songs: A Study in Textual, Melodic, and Rhythmic Hybridity

Noe Dinnerstein (John Jay College of Criminal Justice, CUNY, USA) [Session 3b]

This paper examines traditional song from the former Himalayan kingdom of Ladakh, which meld characteristics from Tibet, India, Central and Western Asia. My analysis will illustrate these cultural/musical different threads, and show how they combined in a number of Ladakhi song types. Congregational songs (*zhung lu*) and related genres originated in the old royal court in Leh. According to informants, the texts for these songs were composed by aristocratic and Buddhist monastic literati based on rules of Tibetan prosody. These texts were then set to music, most likely by palace musicians who sang and played the *surna* and *daman* (double reed and kettledrum), imports from Western Asia. These melodies were composed in isometric rhythms that, while not closely reflecting the text prosody, do reflect phrase structures in those texts. Local discussion of rhythmic types and performance practice reveal implied theory regarding rhythms, including concepts of common rhythmic landmarks. Diverging from more Tibetan-style pentatonic melodies used in nomadic songs (*zhabro*), court-centered genres utilize display differential features in ascent and descent, attributes to border conditions, i.e., mixing of pentatonic ascent with hepta- and hexatonic descent. Further analysis examines melodic contour, both general characteristics, and how this may relate to singing pitch set by the *surna*.

Principles of Transmission and Collective Composition in Turkmen *Dutar* Performance

David Fossum (Brown University, USA) [Session 6b]

In orally transmitted musics, what is the musical model that musicians pass on to their students? If there is room for variability in individual performers' hands, where does it lie, and what learned material must they preserve? In this paper, I explore these questions in a case study of *dutar* performance in Turkmenistan. The Turkmen *dutar* is a two-stringed, long-necked lute optimized for elaborate, virtuosic performance of instrumental pieces. The traditional compositions are through-composed and formally complex. Virtuosos negotiate contrasting demands: to preserve the basic model of the piece while adding original contributions to an ongoing, collective composition process that develops each piece over time. I argue that in the course of learning a traditional piece, *dutar* players internalize compositional principles, applying these to memorized melodic passages in order to further develop the constantly evolving, orally-transmitted composition. These compositional principles range from micro-level procedures (how to extend the logic of a short melodic motif) to more abstract levels of musical structure (how to bring a piece to a climax). I aim to show how *dutar* players employ the same abstract principles in divergent ways to create unique renderings of the same musical model.

Pitch and Tuning in Beninese Brass Bands

Lyndsey Marie Hoh (University of Oxford, United Kingdom) [Session 9a]

Kofi Agawu has argued that scholarly fixation with African rhythm and disinterest in tonality and pitch has precluded musicologists from critically thinking about Western tonal rule as a colonizing force (2003). Indeed, existing scholarship on pitch and tuning in African music emphasizes traditional styles, scales, and instruments, and often fails to interrogate the extent of Western influence on African tonal expression. In reaction to Agawu's provocation, and in contribution to that scholarship, this paper discusses factors influencing the pitch and tuning of imported aerophones, brass instruments, in urban Benin. Drawing from recordings and interviews made during ethnographic fieldwork, I compare pitches produced by individual players across time and space, tuning consistencies within ensembles, and pitches sounded in both Beninese traditional songs and Western hymns. In analysis, I consider how brass instruments' material designs motivate, or demand, Western tonality yet how material conditions—such as instrument disrepair, temperature, climate, and players' ability—limit and constrain it. I argue that perceived “inconsistencies” in pitch and tuning of brass instruments do not suggest an indigenous tonality or conceptual root to tuning and pitch adjustment that resists Western tonal rule, but rather are technical, performative, and sometimes involuntary.

Learning Oliver Mtukudzi's "Tuku Music" through Modular Loops

Matthew Hough (University of California, Berkeley, USA) [Session 9a]

For nearly forty years, singer, composer and bandleader Oliver “Tuku” Mtukudzi (b. Harare, 1952) has cultivated a unique style blending diverse traditional and popular musical influences from inside and outside his native Zimbabwe. This study describes a pedagogical method designed to teach “*Tuku Music*” through active participation using “modular loops,” complete and flexible sets of notated instrumental and vocal parts corresponding to a looped recording of a portion of a larger work. Evidence of this method’s success in teaching Mtukudzi’s music to undergraduate musicianship students, including recorded video of modular loop performances by student groups, will also be presented.

Voices from an Unsealed ‘Time Capsule’: Decoding the Vocal Styles in Okinawan Folksong Singing by Argentinian-Uchinanchu

Wan Huang (Shanghai Conservatory of Music, China) [Session 2b]

Okinawa Diaspora (Uchinanchu) history in Argentina can be traced back to 1908. It is thought to be a ‘Time Capsule’ for it preserves the Ryukyu music style that was no longer prevailing in current Okinawa. Existing research covers its history (1908-1993) focusing on collecting and interpreting its music as “to remember, negotiate, and construct social identity.” (Dale A. Olsen, 2004)

With an interest to explore the ‘old’ singing style and current situation, I started fieldwork in 2014 and I was enchanted unexpectedly by a high incidence of falsetto singing (*Uragoe*) and strongly ornamented vibration in Argentina. It triggers an inquiry on why these unrecorded minute vocal features are highly welcomed and what value can be decoded from them.

This paper adopts computational and ethnographical data into analysis and argues that the special vocal phenomenon has roots in four origins: early style from 1st generation, vibration from Ko-bushi & Enka (mainland Japan), and falsetto singing from *Shima-uta* (Amami) and *La Baguala* (North-western Argentina), which display influences in accordance with cultural processes in Okinawa: *Yamatonization* and *Classicalization*; and in Argentina: an identity rethinking after a 1999 project sending a young generation ‘returning home’. Different vocal techniques mirror different cultural re-positionings within Argentinian-Uchinanchu.

After All, it Was about Music! Discovering Flamenco Genetics through a Pulse-Level Analysis

Bernat Jiménez de Cisneros Puig (atriflamenco.com, Spain) [Session 10b]

Until recently, the presence of Flamenco musical analysis was scarce. Probably, the rule of oral tradition and the image of Flamenco as a marginal folk art, an expression of illiterate characters, have had some influence in this trend. However, in the last decade, the emergence of new musicological studies is showing that the weight of individual freedom and the popular origin of Flamenco are compatible with an extremely clever and rigorous musical ‘grammar’.

Flamenco requires the musicologist to be flexible enough to contrast the terms of the written analysis with an inside knowledge of this music language. After my research towards a holistic vision of Flamenco, I will present the procedure and results of combining a pulse-level analysis with Flamenco rhythmical criteria. By an audiovisual classification of the different genres or ‘*palos*’ into metric groups, we will also realise why it is perceived so often as a cryptic language. Finally, by featuring the two metric

matrices of Flamenco (including all its time signatures) we will see the presence of Hispano-American genes in the whole of it, and not just in the so-called “*palos de ida y vuelta*”.

Microtiming in the Rhythmic Structure of *Candombe* Drumming Patterns

Luis Jure (Universidad de la República, Uruguay) and Martín Rocamora (Universidad de la República, Uruguay) [Session 2a]

The analysis of micro-rhythmic aspects of music has experienced an important development in recent years. Microtiming involves small-scale temporal deviations of events in the musical surface with respect to an underlying isochronous metrical grid. These deviations can take the form of tempo variations like *rubato*; in other cases they rather consist of the time-shifting of events with respect to the steady beats of a constant tempo (e.g. *notes inégales* in Baroque or “swing” eighth-notes in Jazz). It has been recently argued that in some cases microtiming could be better understood by considering non-isochronous beat subdivisions.

This paper presents the results of measuring and analysing the micro-rhythmical properties of the drumming patterns in Uruguayan *Candombe*. *Candombe* rhythm results from the interaction of the patterns of three drums of different size and pitch, and its metric structure—a cycle of four beats and sixteen pulses—shares many traits with other musics of the Afro-Atlantic world.

The analysis of several recordings by renowned players reveals the systematic and consistent use of micro-temporal deviations in the patterns of *Candombe*, demonstrating that microtiming is a structural component of its rhythm.

Structural Analyses of Poly-Ensemble Music of the *Asante* of Ghana

Joseph Kaminski (Wagner College, College of Staten Island, Long Island University, USA) [Session 3a]

This paper addresses the conceptualization of poly-ensemble music in Ghana and the means by which relationships of ensembles may be analyzed. Poly-ensemble music is many ensembles performing simultaneously irrespective of each other, the performance of different songs temporally uncoordinated in the same acoustic space. Such performance simultaneity has been little explored in ethnomusicology (Kaminski 2012, 2014). Poly-ensemble music of the West does exist in twentieth century polytonal works, but in many non-western cultures, particularly Ghana, the randomness of the ensembles maintains a purpose to create sound barrages at rituals. Dissonant barrages made by the poly-ensembles function within the contexts of ancestral veneration of which the Akan peoples take part. Ensembles make staggered entrances, beginning songs that eventually result in simultaneity. Transcriptions of individual polyphonic ensembles reveal the relationships of parts in one ensemble, but constructing a transcription that shows the relationships between the poly-ensembles would be useful. In a sound barrage, layers of sound textures form background, middle-ground, and foregrounds. A Schenkerian analysis may at first seem doubtful arousing skepticism; Schenkerian analysis deals with tonal music, while the sound of poly-ensembles in Ghana is an antithesis. However, layer analyses may represent entrances and time allotments of ensembles within a barrage, further revealing tonal relationships of overlapping themes as well as depth of texture. Linear analyses of sound barrages may show structural aspects of the sound and the tonal relationships of dissonant themes.

The Evolution of Musical Gabonese Heritage: A Musical Phylogenetic Approach

Sylvie Le Bomin (Museum National d'Histoire Naturelle - Ecoanthropologie Ethnobiologie, France), Evelyne Heyer (Museum National d'Histoire Naturelle - Ecoanthropologie Ethnobiologie, France), and Guillaume Lecointre (Museum National d'Histoire Naturelle - Ecoanthropologie Ethnobiologie, France) [Session 10b]

Music, like languages, is one of the key components of our culture, yet musical evolution is still poorly known. Numerous studies using computational methods derived from evolutionary biology have been successfully applied to varied subset of linguistic data.

One of the major drawback regarding musical studies is the lack of suitable coded musical data that can be analyzed using such evolutionary tools. Here we present for the first time an original set of musical data coded in a way that enable evolutionary approaches. Using phylogenetic methods, we test two competing theories on musical evolution: vertical versus horizontal transmission. We show that, contrary to what is currently believed, vertical transmission plays a key role in shaping musical diversity. The signal of vertical transmission is particularly strong for intrinsic musical characters such as metrics, rhythm, and melody. Our findings reveal some of the evolutionary mechanisms at play for explaining musical diversity and open a new field of investigation: musical evolution.

Trans-Cultural-Stylistic Solutions of Toshi Ichianagi's *Transfiguration of the Moon* (1988), for *Shô* and Violin

Joshua Banks Mailman (University of Alabama, USA) [Session 1a]

Japanese composer Toshi Ichianagi (1933-) connects to various 20th compositional-artistic practices including American neo-classicism, chance/aleatoric music, Neo-dadaism (Fluxus), minimalism, and 12-tone serialism. He has composed for Japanese *gagaku* instruments and fostered cultural cross-fertilization between Japanese and the West.

Ichianagi's *Transfiguration of the Moon* (1988) exemplifies a logistics-savvy east-west fusion. It is scored for violin and *shô*, which is a vertical bamboo mouth organ (like a harmonica) that plays dissonant cluster chords in traditional Japanese *gagaku*. Analysis of *Transfiguration* reveals phenomena from Second Viennese School repertoire, including aggregate completion, pc set complementation, and contextual transposition. The pitch-class material is configured to reference the cycle-of-5th (pentatonic) basis of not only Western string instruments but also the pillar tones of the six pitch modes (*rokuchoshi*) of *gagaku*.

Most intriguing of all, however, is Ichianagi's handling of texture. The violin and *shô* often move in similar but non-identical rhythms and closely in pitch, which references *gagaku*'s heterophony. Furthermore, within this texture Ichianagi creates composite lines by employing close but unequal triplets (7:6, 6:5, 5:4) in each instrument, which also creates an oscillating timbre. Yet the average interval size in the composite line (vs. within each line) fluctuates, thus conjuring a hauntingly subtle transfiguration.

Towards Understanding Options and Rules for Singing Chinese Verse in Early Japan

Elizabeth Markham (University of Arkansas, USA) [Session 1b]

By the eleventh century in Japan, a term *rôei* ("voiced performance of verse") had attached to a particular courtly vocal repertory built on verse-fragments written in Chinese, and Buddhist *kada* hymns in Chinese verse-forms appear marked-up with dots of apparent tonal significance. Stabilisation of rules

and procedures of an original improvisatory practice seem to have led to reliance on (writable) schematic musical form(s) (Hopkins 1986; Widdess 2013) for carrying Chinese verse—on a principle stretching from formulary intonation to standard text-setting template (Picken 1966, 1969) combined with modal tune-model (Markham 2008, 2013). Contracted and re-stretched, melodic gestures decomposed and rebuilt, one such combinatory form came to accommodate various verse-forms of varying line-lengths, Chinese and Japanese, sacred and secular, and for various modes of vocal rendition.

This paper offers support for these observations by: (i) collating evidence for the singer's formulaic working with a tune-model from realisations frozen in large bodies of neumations for temple *kada*, extant from the thirteenth century, with (ii) a contemporaneous synoptic musical analysis and condensed graphical representation of the grammatical procedure for the *kada*-hymns, based on oral transmission, invoking conventions and terminology of segmental tone and poetic form, and recorded in a Buddhist performance-orientated treatise.

Lines of Influence: Musical Transcription as Revelatory Tool

Sue Miller (Leeds Beckett University, United Kingdom) [Session 5b]

This paper argues that through the creation of transcriptions of recorded music, lines of influence can be traced with regard to stylistic development within many popular and world music traditions. Transcription using standard Western notation can reveal cultural and creative processes contributing to a more complete history of specific musical styles and performance practices. Musical sound is demonstrated in this research to be cultural, and transcription shown to be an indispensable tool for investigating the role of influence in the development of a style. Using case studies of clave-based improvisation in Cuban dance music and its related US 'Latin' popular music forms, ethnographically-based and stylistically appropriate transcription demonstrates how this mode of investigation is an effective means of testing out ethnographic fieldwork; it can reveal subtle information about cultural and social history alongside insights into the creative process. Transcription is used here as a mode of investigation, one which is firmly embedded within ethnography, fieldwork and performer-as-researcher methodologies. A contextualised transcription is thus a revelatory tool which highlights connections between players, recordings and performance traditions.

Queer Bolero: Bolero Music as an Emotional Space among Gay Men in Special-Period Cuba

Moshe Morad (Ono Academic College, Tel Aviv University, Israel) [Session 5b]

My research and book deal with the role of music as space for identity, interaction and escapism, among gay men in Cuba during the era of financial crisis known as "the Special Period". One of the "musical spaces" I discovered was emotional, rather than physical, provided by bolero music, constructed by queer appropriation of the lyrics and through identifying with the over-sentimental character of its music, poetry and performance.

This paper identifies particular characteristics of bolero that gays identify with: the melancholic musical character, the ambiguous discourse allowing queer interpretations, the tragic and "deviant" heroes, and the melodramatic and "camp" performance style.

Popular themes in bolero lyrics, such as danger, suffering, betrayal, illusion and disillusion, and being "prohibited"; and its characteristic ambiguity, melancholia, nostalgia, hysteria, and liminality, resonate with the emotional and psychological (and sometimes even physical) world of many gay Cubans during the Special Period. In the needy, oppressive, and restrictive environment, and the lack of physical

spaces for gay socializing and self-expression, bolero became an important outlet for self-affirmation and consolation, mostly experienced in private, listened to and mimed, at kitchens or private fiestas, where the music triggers a state of emotional transformation I describe as “Bolero mode”.

Two-Voice Frameworks and the Harmonization of Indian Ragas

Robert Morris (Eastman School of Music, University of Rochester, USA) [Session 1a]

The present paper develops topics in a previous paper by Morris and Ravikiran (2006) that surveys some of the technical possibilities of raga harmonization in Carnatic music. We study some properties of Carnatic and Hindustani ragas that permit the construction of two-voice polyphonic frameworks. Similar frameworks have been used in western common practice music and jazz to provide a polyphonic base for the harmonization of melodic lines; our two-voice frameworks can similarly function to enable the harmonization of melodies based on different ragas.

An important raga attribute is its underlying scale. Ragas may have from 4 to 12 notes, but the norm is 7 taken out of the 12 chromatic pitch-classes. Various frameworks are formed by superimposing a raga scale upon itself under transposition and/or inversion. We are interested in cases where a framework satisfies a *verticality condition* (VC), so that—in this paper—the framework’s vertical intervals form only unison/octaves, thirds of 3 or 4 semitones, and/or sixths of 8 or 9 semitones.

The paper shows how to construct frameworks with VC using simple hand-algorithms based on principles from mathematical combinatorics and scale theory. It concludes with examples of how the frameworks are used to harmonize contrasting ragas.

Towards a Theory of Formal Functions for North Indian Classical Music

Somangshu Mukherji (University of Michigan, USA) [Session 8b]

Despite renewed interest in studying form in Western music scholarship, seen for example in William Caplin’s form-functional theory, little of this interest has been directed to non-Western music. My paper addresses this situation, through a form-functional exploration of the *rāga*-based classical music of North India. Although this might seem an arbitrary extension of Western formal ideas to Indian music, formal functions are just beginnings, middles, and endings in music—which are implicit in ‘emic’ Indian ethno-theoretic descriptions of *rāga* performance. I will therefore discuss several such formal functions in *rāga* music. But Caplin has also described such functions as the internal meanings of music, which can be interpreted from its underlying grammar. So, I will illustrate how the above formal functions in *rāga* music arise from *rāga* grammar, developing in the process some ideas about the grammar-meaning connection in Indian music—which is something that has been neglected, despite the interest in exploring *rāga* structure that has long-persisted in musical scholarship. All of this suggests that form-functional studies can provide insight into grammar-meaning connections in music more generally. Consequently, I will end with a discussion of what this implies for a more universal theory of formal functions.

Collaborative Timelines: Metric Identity in *Malinke* Dance Drumming

Tiffany Nicely (University at Buffalo, USA) [Session 8a]

The importance of “timeline” patterns in the organization of African music is well documented (Rahn 1986, Anku 2000, Toussaint 2003, Agawu 2006, Polak 2010). Sometimes called “time cycles,” or “standard patterns”, these are most often performed on iron bells or other timbrally distinct instruments within an ensemble. Whether audibly present in the texture or active only in the minds of performers and listeners, their role as an organizing, contextualizing force has been compared to pitch scales (Pressing 1983), and more recently, shown to participate in meter (London 2012).

My analysis of pieces from the Dundunba and Kassa families of Malinke dance rhythms maps Kubik’s (2010) explanation of African musical time as an interface of elementary pulsation, reference beat, and timeline, to London’s (2012) meter as organization of N-cycle, beat cycle, and (non-isochronous) sub-cycles. The analysis demonstrates two things; that timelines are created collaboratively in Malinke drumming, and that these timelines are an essential part of the musical time in a way that is akin to entrained meter.

Analyzing Traditional Hungarian Dance and Music: Developing a Framework from the Needs of Performance

Judith E. Olson (American Hungarian Folklore Centrum, USA) [Session 10a]

Transylvanian instrumental music exists primarily in relation to dance and is played by musicians, usually Roma, hired for dance parties and events. The improvised “performance” that evolves results from the interaction of musicians and dancers, often responding to what they know of each other from previous events.

This discussion explores basic form and characteristics of traditional Hungarian dances noting signposts within the dances and a range of appropriate choices. Rhythmic nuance is often distinct by village, and musicians map out tempo areas and sustain them according to what they observe dancers need. Within these areas, songs signal the dancers and providing context for their interaction with the *Primás*. Many local-level musical devices—bowing, ornamentation, actions of supporting instruments—are brought to bear to support dancers at a moment in time.

The *Kalotaszegi legényes* is a men’s dance in strict form (although variable length). Individual dancers may actively choose tempo, melody, and rhythmic emphasis, directing the musicians by their motions. In couples dances, the band takes the lead in structuring the dance, but the band and dancers actively interact on content and timing.

Examples will be from archival films of traditional dance and many videos taken over the past 15 years.

Automatic Detection of Outliers in World Music Collections

Maria Panteli (Queen Mary University of London, United Kingdom), Emmanouil Benetos (Queen Mary University of London, United Kingdom), and Simon Dixon (Queen Mary University of London, United Kingdom) [Session 9b]

In big data collections it is often important to identify outlier behaviour that should be filtered out or treated differently. In music this could help us identify sound recordings that stand out in a recorded music collection. We call these recordings ‘outliers’ and perform a computational analysis to detect them. We focus on world and traditional music collected from available sound archives. Using signal processing tools we extract audio features that denote rhythmic, melodic, harmonic, and timbral

aspects of each recording in our collection. Outliers in the dataset are detected with data mining techniques. A sound recording is an outlier depending on how distinct its musical characteristics are compared to other recordings in the collection. However, outlier recordings can also be detected in cases where the descriptors have failed to capture the correct attributes. To evaluate our findings we perform a listening test with music experts. From preliminary results we are able to capture, amongst other, songs with distinct patterns of timbre and rhythm but also speech samples as outliers. The proposed methodology can help identify sound recordings that have a unique musical character or filter irrelevant audio from music collections.

How West African Drummers Keep in Time Together. Musical Roles and Individual Behavior in Ensemble Entrainment in Jembe Music from Mali

Rainer Polak (Hochschule für Musik und Tanz Köln, Germany), Nori Jacoby (Massachusetts Institute of Technology, USA), and Justin London (Carleton College, USA) [Session 2a]

Malian drum ensembles involve three distinct musical roles: a variative lead drum, a repertoire-specific timeline, and one or several accompaniment ostinatos. Two studies examined the timing interactions amongst these roles in a range of ensembles and repertoire. The first involved fifteen recordings of three pieces in two different meters and three different ensemble sizes. Timing analysis shows tight synchronization amongst ensemble members (asynchronies $\leq 1\%$ of the beat, i.e., $\pm 5\text{ms}$). Using both linear phase correction modeling and Grainger Causality we found no clear “leader” among the parts, but one “follower:” the lead drum. Our second study (in progress) involves the systematic switching of players in the different ensemble roles to see (a) if they replicate the role-specific patterns of timing found in Study 1 and (b) examines the degree to which individual players can modify or override those roles. Our finding that the lead part is the most adaptive part in terms of ensemble timing suggests that usual concepts of hierarchy and leadership are inappropriate for understanding synchronization in Malian drum ensembles. They also contradict the Africanist concept of timeline as a central timing reference, since it rather is the accompaniment plus timeline parts together that play the time-keeping role.

Revisiting the Katanga Guitar Style(s) and the Origins of African Guitar Music

David Racanelli (Dowling College/Eugene Lang College, The New School, USA) [Session 9a]

During the 1940s and '50s, the “Katanga Guitar Style” emerged in the urban mining towns located along the Copperbelt in southeastern Zaïre and northern Rhodesia (Zambia), inspiring the first attempts to document, analyze, and interpret early African guitar idioms. As a musical conglomerate, the Katanga guitar style encompasses a multiplicity of influences, techniques, and approaches that provided the basis for subsequent musical developments in which the guitar served as a common denominator. In this essay, I will examine the Katanga guitar style(s) in great detail, focusing upon manual vamping and finger-style techniques. I aim to show the extent to which variants of Copperbelt guitar music can be distinguished from one another, using certain shared features and characteristics such as playing techniques, time line patterns, and cyclical harmonic progressions as a baseline for comparative analysis. Borrowing from cultural anthropologist James Ferguson, who authored the monograph *Expectations of Modernity* (1999) that explored social life on the Copperbelt, I adapt an analytical framework for stylistic variation in which local and cosmopolitan strategies are considered. A model for Copperbelt guitar music should be broadly conceived in order to accommodate multiple localist and cosmopolitan socio-musical characteristics that compete and/or reinforce one another. In the end, the reader will gain valuable insights concerning the degree to which ethnographic and musical analysis can be well integrated, making them mutually reinforcing. While the Katanga guitar style was widely

adapted, leading to degrees of stylized variation in guitar playing especially in Kenya and Tanzania, the term Katanga guitar style requires further clarification.

Formative Processes of Durational Projection in “Free Rhythm” World Music

John Roeder (University of British Columbia, Canada) [Session 2a]

This paper considers how Christopher Hasty’s concept of durational projection can contribute to an analytical understanding of a variety of “free rhythm” world music, highlighted by Clayton, Frigyesi, Wolf, Widdess, and others. Durational reproduction can be heard even in the absence of regular pulse streams, entrainment, or oscillating waves of attention. It is afforded by even the shortest, most irregular successions of events, and a large variety of temporal sensations can be attributed simply to it.

I first demonstrate the basic concepts with reference to an item of Persian classical music, in which local durational reproduction can be heard to establish and nuance the pitch hierarchy of the underlying *dastgāh* modal-complex.

I then present two larger-scale analyses. In a flute solo from Papua New Guinea, the repetition of a pitch cycle is enlivened by the interplay between two ways of hearing some recurring events—as anacrusis, or as beginning—and that ambiguity can be heard to open up an avenue for the cycle to change and develop. The second analysis treats the beginning of an *ālāp* performed by Budhaditya Mukherjee. It introduces and highlights structural pitches through a specific rhythmic gesture that relies for its effect upon listeners’ projective comparisons.

Pure Folk Metal: Hybridization of Musical Styles in Folk Metal Band Eluveitie

Milena Schaller (Northwestern University, USA) [Session 7a]

Eluveitie, a Swiss folk metal band that connects themselves to the ancient Helvetians, regularly uses Irish, Scottish, and Breton folk melodies. Although Eluveitie performs on tin whistle, violin, bagpipes, and hurdy-gurdy, they incorporate folk music idioms into a decidedly metal texture, with drums, electric guitar, and driving metal rhythms. Through close analysis of their 2008 album *Slania*, I examine the hybridization between two stylistic codes, folk music and metal.

I show how folk melodies and concepts are incorporated into Eluveitie’s music, and how that borrowing reflects the way they view themselves in relation to the folk traditions they choose to use. Eluveitie recasts folk melodies by translating them into modes more common to metal, eliminating elisions that complicate the meter, and adjusting rhythmic details in order to strengthen the sense of each downbeat.

Even though Eluveitie draws from folk and metal tradition, their music does not completely inhabit the stylistic codes of either genre. Neither do they conform to dominant ideologies of authenticity in metal or folk traditions. Instead, by appealing to the mysticism of ancient Celtic symbols and bridging two musical genres, Eluveitie taps into metal ideas of power and folk concepts of heritage and nationality.

Embodied Performative Knowledge as Crucial Analytical Tool

T. M. Scruggs (University of Iowa, USA) [Session 10a]

The learning process and the actual performance within the cultural context of a given music affords researchers insights otherwise unattainable. My field research on the *marimba de arco*, the “marimba with an arc” of western Nicaragua, has included a significant level of proficiency on the instrument. In this paper I first make several observations on how the special role of teaching and learning of a musical tradition affords unique insight into the “building blocks” of a musical system and allows for a testing of its boundaries. I then examine how the potentials and restraints inherent in the make-up of the human body impinge upon the structuring of musical production. My performance in traditional context revealed a link between the physicality of hand positioning of the mallets and a certain feature of the music’s melodic structure. In a further layer of bi-musical discovery, through accompaniment of the dance reserved for the *marimba de arco* my use of this stylistic feature revealed a specific kinetic relationship to the choreography, a correlation that subsequently helped to substantiate the repertoire’s previous improvisatory nature. This analysis, with its socio-historical insights, could only have flowed from a (literally) embodied understanding of the parameters of music performance.

Exploring Motivic Features for Understanding Modal Structure: The Case of Seventeenth-Century Turkish Vocal Songs

M. Emin Soydaş (Çankırı Karatekin University, Turkey) [Session 6b]

There have been attempts for analyzing, or generating a methodology for the analysis of the modal structure of the songs belonging to different genres of Turkish music, either historical or contemporary. In some of these works, specifying melodic motifs is a part of the analysis, being often used as an initial tool for determining the larger formal sequence, and also for subsequent observations which are mostly interested in the inter-motivic relationships. This paper will present a different approach for the use of motifs in analyzing Turkish music, by taking a group of vocal songs from the seventeenth century as point of departure. In my research with these songs, a detailed exploration of motivic features is expected to serve as a reference for better understanding the modal structure. These include the first notes, number of different notes, emphasized notes and preceding ones, contours, number of different melodic movements, and spans. Observing the common or major characteristics regarding the motifs among the songs that belong to a specific *makam* could help to find out the inner texture which contributes to the modal structure, and which might not be found in theoretical definitions.

Healing on the Margins: Rhythm and Repetition in Gnawa Music

Maisie Sum (University of Waterloo, Canada) [Session 8a]

The notion that music has the power to heal has ancient origins. Therapeutic use of music in clinical settings, however, only emerged in the mid-twentieth century, and until recently, has mostly been grounded in the social sciences. With recent technological advances, evidence of music-induced benefits on brain function has opened up new possibilities for the use of musical intervention in the domain of the health sciences. Musical rhythm in particular has been shown to be effective in physical and cognitive rehabilitation. This preliminary study explores Gnawa music’s capacity to heal. Among the Gnawa, a sub-Saharan-Berber-Islamic group found throughout Morocco, music plays an integral role in rituals, some of which have therapeutic purposes. Their use of music in healing is not unique; however, research suggests that Gnawa music has the potential to transcend cultural boundaries and benefit listeners unfamiliar with the music, language, and meaning. Does Gnawa music have an inherent structure or attributes that contribute to its capacity to heal cross-culturally? How does Gnawa music function as a stimulus that influences brain activity? Informed by recent theoretical and applied studies

in the areas of neuroscience and music; research on music, emotion and affect; and works of Gnawa and trance scholars; the music-centered approach sheds light on the centrality of rhythm and nuanced repetition of music on therapeutic effectiveness and extends Gnawa studies in which healing has been treated primarily as an outcome based on ritual phenomena. This paper contributes to scientific studies in music and healing in cultures worldwide, the growing research in medical and cognitive ethnomusicology, and more broadly, to interdisciplinary studies in music, health, and wellbeing.

Steve Reich and Balinese Gamelan

Michael Tenzer (University of British Columbia, Canada) [Session 1a]

Much attention has been paid to the impact of Ewe (Ghanaian) music on Steve Reich in the 1960s and early 1970s, owing to his immersion in the scholarship of A.M. Jones, his study trip to Ghana in 1972, and subsequent writings on the subject. This paper considers in detail for the first time his interactions with Balinese gamelan music. It fills this lacuna with a twist, taking a critical stance incorporating how the Balinese musicians with whom Reich interacted likely reacted to his music, thus giving voice to their perspective, and by considering Reich's compositions alongside analysis of specific Balinese compositions that he is known to have learned. The first part of the paper, based on research with Reich's notebooks and scores in the Paul Sacher archives in Basel, surveys the composer's thought on Balinese music, influence that can be observed—with pointed emphasis also on what was not influential. The second part considers two Balinese compositions: *Cak*, or the so-called Ramayana Monkey Chant, and *Sinom Ladrang*, a classical piece he learned directly from Balinese musician Nyoman Sumandhi at the American Society for Eastern Arts in 1973, and explains what Reich found of interest and what he eschewed.

“There’s Gold in Them There Hills!,” or Mining for Drum Patterns: Computational Analysis of Balinese Kendang Arja Improvisation

Leslie Tilley (Massachusetts Institute of Technology, USA) [Session 9b]

Balinese *arja* drummers are among the most respected musicians on the island. Unlike drummers of other genres, whose paired patterns are carefully composed to interlock, two *arja* drummers create fast, intricately interlocking patterns through simultaneous improvisation. Analysis of their playing suggests unspoken rules and possible model patterns guiding improvisation. Yet, when the collection of improvised patterns under analysis becomes too large, interpreting one's findings in a statistically accurate way can be an onerous task. Here, computational analysis presents an exciting arena for ethnomusicological inquiry. In this presentation, I explore the ways in which an ethnomusicologist without extensive computer science training can use the programming language *python* to develop a more accurate picture of conscious and subconscious decisions made by Balinese *arja* drummers in the course of performance. Analysing a small collection of patterns taught to me by three master drummers as a test case for a much larger future study of over 40,000 improvised drum strokes, I search for statistically relevant patterns: an exploration inexorably framed in the context of the oral, informal music theory on *arja* that I have collected in my fieldwork. I thus present an interdisciplinary analytical study that blends the computational and statistical with the ethnographic.

Measuring the Perceptual Similarity of Middle-Eastern Rhythms: A Cross-Cultural Empirical Study

Godfried Toussaint (New York University Abu Dhabi, United Arab Emirates) [Session 10b]

A study done previously with a group of listeners at Harvard University, not familiar with traditional Middle Eastern music (Toussaint, Campbell, & Brown 2011) was replicated with subjects at New York University Abu Dhabi (United Arab Emirates), who were familiar with traditional Middle Eastern music. The experiment used nine Middle Eastern and Mediterranean rhythms consisting of two sounds, a low (*dum*) and a high-pitched (*tak*). The rhythms vary according to meter complexity, as well as the numbers of pulses, *dums*, *taks*, and onsets that they possess. The results of the two groups were compared with each other and with predictions made by the edit distance and a feature-based similarity measure that incorporated metrical, grouping, and structural information. The effects of grouping and meter on judgments of rhythm similarity were also compared. The main questions explored are whether: (1) the Harvard subjects judge the rhythms higher up on the similarity scale than their New York University Abu Dhabi counterparts, and (2) whether the judgments of the Harvard subjects depend on surface features such as rhythm length, the number of onsets, and the number of “*dum*” sounds present, rather than the underlying meter.

Analysis-By-Synthesis of Rhythm in South Indian Art Percussion Performances by Means of Statistical Analysis

Konstantinos Trochidis (New York University Abu Dhabi, United Arab Emirates), Carlos Guedes (New York University Abu Dhabi, United Arab Emirates), Andre Holzapfel (Austrian Research Institute for Artificial Intelligence (OFAI), Austria), Akshay Anantapadmanabhan (Independent Musician, India), and Andrija Klaric (New York University Abu Dhabi, United Arab Emirates) [Session 4b]

Computational analysis of music performances has been focused so far mainly on Eurogenetic Classical music. The present work, contributes to the diversity of performance studies by investigating rhythmic structure in Carnatic or South Indian Art *ādi tāla* percussion performances. The aim of the paper is twofold: Firstly, on the side of analysis, we aim to obtain insights into the rhythmical organization of recorded performances using audio signal analysis and clustering pattern modeling. Secondly, on the generative side, we test a methodology of automatically generating Carnatic style percussive rhythms, based on the analysis results. The analysis results in a set of rhythmic pattern, along with transition probabilities between them. To obtain these patterns, the audio signal is annotated based on the frequency of the stroke (low/mid/high) and energy changes are extracted for the different percussion strokes. Next, the onsets of each stroke category is clustered to reveal a set of rhythmic patterns, and conditional probabilities are estimated that describe the transitions between these patterns. We present a real-time software, in which all aspects of a performance can be controlled through intuitive graphic displays of rhythm patterns, and through a visualization of conditional probabilities that influence the temporal progression of the performance.

Epirus Polyphonic Singing and GTTM Analysis: Issues of Prolongation, Hierarchy and Modal Pitch Space

Costas Tsougras (Aristotle University of Thessaloniki, Greece) [Session 3a]

The application of Lerdahl & Jackendoff's *Generative Theory of Tonal Music* (GTTM) to the Epirus polyphonic singing is supported by the GTTM's flexibility as a reductional analytical methodology—due to the substitution of the tonally specified fundamental structure with the cognitively based normative structure—and requires the formulation of the idiom's special well-formedness/preference rules and the description of its tonal hierarchy. The present paper builds upon the author's research on the

application of GTTM to modal music and research presented in AAWM 2014 and focuses on special methodological and analytical issues. The idiom's tonal hierarchy is disclosed by the categorization of its modal sonorities, and explained by an adaptation of the Tonal Pitch Space theory and the concept of intrinsic/sensory vs. cultural stability of musical events. Moreover, statistical/computational analytical tools are employed, highlighting characteristic distributional and transitional properties of the idiom's chords, in an attempt to articulate the special stability conditions. Research results include, apart from a summary of stylistic features, the formulation of the special modal pitch space, a description of the idiomatic normative structure and its cadential schemata and a set of new or modified GTTM rules.

Rethinking the Tabla Solo

Vivek Virani (University of California, Los Angeles, USA) [Session 4b]

In this paper, I present an analysis of classical tabla solos by three contemporary masters of tabla: Swapan Chaudhury, Zakir Hussain, and Suresh Talwalkar. These analyses explore the decisions made by each artist about structure and presentation, drawing from conventions of lineage as well as personal aesthetic sensibilities. At the macro level, I describe the form of the solos, detailing how compositions are chosen and arranged, and how the performers transition between compositions. At the micro level, I discuss how the performers develop and improvise material within a single composition. I aim to demonstrate how these three solos illustrate performative paradigms that fall outside the boundaries of emic terminology and categorization, but have been tremendously influential within the field of classical tabla at large. I will further suggest that these artists represent three attitudes toward the role of "tradition" or convention in tabla solo performance, yet all three demonstrate exceptional individual creativity in their playing.

A Counterpoint for Catching a Tiger

Anton Vishio (William Paterson University, USA) [Session 3a]

The tiger-catching songs of the Minangkabau of western Sumatra must rank among the most haunting musics ever committed to disc; the combination of close, imitative counterpoint initiated by a shaman and then answered by the *saluang* pays deep respect to the tiger while insisting on the mysterious boundary separating the human and tiger domains. The counterpoint is remarkably fluid; while stable in its intervallic structure, via a framework described by Margaret Kartomi, the temporal structure of the imitation is quite variable, with many timbal and ornamental fluctuations from a basic model. The paper focuses on these fluctuations, exploring various ritual- and text-based motivations. Larger conclusions about the repertory of these songs are likely to be forever beyond our grasp, given the reluctance of practitioners to reveal higher levels of the songs to outsiders, not to mention the precarious state of the Sumatran tiger itself; instead, the paper must cast a wider net, exploring how the polyphony of the song is situated in the diversity of world polyphonies.

The Complex Plane for Visualizing Quantitative Effects of Phase Interpretation on Inferred Clave Using Several Measures of Syncopation

Mehmet Vurkaç (Oregon Institute of Technology, USA) [Session 5b]

The standard explanation of clave direction in most English-language materials for instruction (primarily influenced by Afro-Cuban traditions) divides the clave figure into first and second halves, and compares these in terms of template-matching to standard subsequences. The contrasting approach proposed in

the recent grammar for Afro-Latin rhythm is to compare the off-beatness values of sections 90° phase-shifted from the standard, without the need for reference to standard patterns.

While the latter approach is demonstrably more consistent with the traditionally ascribed clave direction in many cases, in the years since its development, examples of music from Cuba and Uruguay have been found for which this approach does not always agree with the requisite interpretation of clave direction. A visualization technique is proposed and demonstrated that can accommodate both approaches to interpreting clave direction, and do so while taking into account almost any proposed metric. To investigate the interplay of cultural context and analytical approach in this fashion, metrics are plotted in the complex plane according to each clave demarcation. Just as AC voltages experience 90° phase shifts in traversing reactive elements, and this phase shift is represented graphically in the complex plane, the two demarcations of clave direction are related by a 90° shift, and can thus be displayed together on the complex plane. Using several measures of off-beatness from the literature on rhythm, we visualize the effect of each phase on determining clave direction, investigate the degrees to which measures of off-beatness agree with the traditionally accepted direction and with one another, and demonstrate that this novel technique for displaying clave information also reveals the strength of clave directionality in each pattern.

Theorizing *Trikāla*: A Generalized Intervallic Approach to Pulse Transformation in South Indian Carnatic Music

Robert Wells (University of South Carolina Upstate, USA) [Session 4b]

The rich rhythmic-metric construction of South Indian Carnatic music is characterized, in large part, by intricate interplay between an internalized metric cycle called the *tāḷa* and performed phrases that may generate expressive tension with this *tāḷa*. Thus, informed listeners, who track the *tāḷa* using standardized hand gestures (*kriyās*), may experience substantial internal conflict. A common source of such conflict is *trikāla* technique, in which the performed pulse unit expands or contracts over constant *tāḷa*. While *trikāla* has been thoroughly described by ethnomusicologists, it has received little attention within the music-theoretic realm.

Thus, this paper seeks to approach *trikāla* technique from the perspective of Lewin's (1987) transformation theory, applying the metric generalized interval system Met developed by Wells (2013; 2015a; 2015b) to the problem of representing and quantifying this technique. Part One will introduce the notions of intervallic expansion and contraction in the context of Met and demonstrate how these principles can represent *trikāla* technique. Part Two will then apply these ideas to a new analysis of a *rāgam-tānam-pallavi* performance previously investigated by Widdess (1977). This Met-based analysis will reveal hidden aspects of the performance's metric workings while suggesting new possibilities for rhythmic-metric analysis of Carnatic music.

Melodic Structures and Modal Development of *Malḥūn* Sung Poetry in Morocco

Christopher Witulski (Florida State University, USA) [Session 1b]

Many across Morocco love *malḥūn*, a genre of accompanied sung poetry, irrespective of educational background or economic stature. The poorest Moroccans memorize long segments of their favorite texts, ready to sing upon request, while the wealthiest gather in hotel ballrooms to celebrate *malḥūn* as national cultural heritage. In this paper, I draw upon ethnographic research, an analysis of over 75 common melodies from both old and new recordings, and my performance experience with an ensemble in Fez, Morocco, to create the first musical analysis of a large body the genre's melodies. I analyze the relationship between pitch collections and motivic movement to question the nature of musical development by cataloging and analyzing modulations between the genre's repetitive melodic

figures. In doing so, I outline large-scale structural motion within these sung poems. Throughout many of the country's primarily domestic musical genres, modality is understood melodically: "shape" or "contour" (*qiāns*) takes precedence over pitch content and tonal center, widening a literal and figurative range of possibility for performers. This work contributes to my larger argument that *malhūn* artists maintain a high degree of flexibility for musical creativity and expressions of performed ideologies, including nuanced relationships with local Islamic public piety.

A Comparative Study of the Impact of Different Gamakas on the Structure of the Mohanam Varnam, "Ninnu-kori": Investigating the Gamaka Box Notation System

Jeremy Woodruff (Istanbul Technical University, Center for Advanced Studies in Music (MIAM), Turkey) [Session 8b]

My analysis of transcriptions of the *Mohanam varnam*, "Ninnu-kori" by three vocalists and three flutists investigates the structural importance of differently applied *gamakas* (ornaments) in the composition. My reductions using typologies of contour in continuous melodic movement in-between fixed instances of the raga's pitches, show how different *gamakas* change the overall structure of the composition. A final version of the *varnam*, by film composer and Karnatic musician Ramesh Vinayakam is included, along with video of him teaching it to me. His version was written (with *gamakas*) on paper before our lesson, using his *Gamaka Box* notation system (Vinayakam, forthcoming). To contextualize the analysis, I first investigate the significance of differences between Vinayakam's version and the six transcriptions. Secondly, showing how Vinayakam's notation provided a short cut, I compare my experience of learning the *varnam* "off the page", to the experience of other authors who have learned Karnatic music via the standard aural method such as Weidman (2006) and Allen (2004). Lastly, I comment on learning Karnatic music from a detailed notation, in the context of the oral tradition.

The Renaissance of Tang Zheng: Reappropriations of Classical Zheng in Modern Zheng Culture

Yuan-Rong Wu (Soochow University, China) [Session 2b]

According to Mark Slobin, artists inevitably invent new styles in response to contemporary life, even while attempting to restore the past. Slobin's insight is particularly useful if we wish to draw out the aesthetic, cultural, and political concerns that have emerged in the revitalization of *Tang Zheng* that began approximately five years ago in China. Fu Ming-Jian has been a primary figure in this movement. This paper builds on current scholarship of the concept of "revival" by examining his creative appropriation of *Tang Zheng* and is one of first studies to include an interview with a practitioner in the field.

Fu's reconstruction of *Tang Zheng* involves several important historiographical and aesthetic aspects. Fu has criticized the modern practice of *Zheng*, which places heavy emphasis on virtuosic technique, wishing instead to balance the traditional and the modern. Departing from Tamara Livingston's claim that revivalists are habitually opposed to modern and mainstream culture, Fu seeks to mobilize the tradition as a means of creating a viable alternative to modern *Zheng* music. Adding to the complexity of this "revival," Fu has appropriated certain modern *Zheng* techniques in inventing new performance styles for the older thirteen-string *Zheng*.

Speaking a Hybrid Language in Chinese Electroacoustic Music

Yinuo Yang (Soochow University, China) [Session 1a]

The first generation of Chinese composers to work in the field of electronic music became active in the 1980s. An awareness of the late beginning of this work, in comparison with developments in Europe and the United States, propelled Chinese composers to seek a distinctive path. Chinese composers and critics have sought in recent years to offer an evaluation of the significance of these early achievements. A critical consensus has emerged that views the success of Chinese electroacoustic composers as dependent upon the fusing of traditional, national Chinese stylistic traits with Western technology. One of the leading first-generation composers, Zhang Xiaofu, imported the tradition of electroacoustic music from France to the conservatories of China, and in so doing emphasized the importance of integrating these disparate cultures.

This paper argues that the distinctive practice of electroacoustic music in China involves the convergence of culturally specific connotations of gesture and sign with the abstract character of electronic sounds. An analysis of Zhang Xiaofu's work *Lianpu* demonstrates the strategies by which a first-generation composer of electroacoustic music sought to "speak" a hybrid language for the first time.

Theoretical Music Treatises in the Fifteenth Century Timurid Music: An Analysis of Benâî's "*Risâle-i Mûsikî*"

Zeynep Yıldız Abbasoglu (Independent Scholar, Turkey) [Session 3b]

Timurid Music, which developed in the lead of art patrons of the Timurid Empire that prevailed during 15th century in Central Asia, is a musical period that led to treatises which were read and annotated in the Central Asian, Middle Eastern and particularly Ottoman territories. These treatises are classified under books which were named as "*edvâr* (circles)" as they explain the modal and rhythmic structures using circles when explaining the musical theory during that period. Among these treatises that use the modal system founded and developed by Safiyüddin Urmevî while bringing contemporary interpretations and different approaches to it, Benâî's *Risâle-i Mûsikî* (Treaties of Music) has a significant place. Benâî, who generally treated Urmevî's modal system with an instructive style, left an important clue on the musical practice of his period by a musical piece written in the "*ebced*" notation at the end of his treatise.

In this presentation, within the theoretical musical system which was disclosed by the treatises of 15th century Timurid Music, I will explain the distinguished features and signification of Benâî's treatise in that time and today and specifically analyze the "*ebced*" notation of the aforementioned music piece and transmission of music during that period.

Special Session

Analysis and Ethnography

Respondent: Michael Tenzer (University of British Columbia, Canada)

Approaches for the analysis of world music are commonly developed by scholars with disciplinary roots in either ethnomusicology or music theory. Considering the modes of inquiry most often cultivated in these two fields it is understandable that much existing scholarship undertakes the analysis of world music from a perspective heavily weighted towards either music analysis or ethnographic research. While such work undoubtedly makes a valuable contribution to the field, the analysis of world music

also offers a rich opportunity for integrating the methods of both disciplines. The presentations in this session engage with this prospect in different ways, striving to generate insights leading beyond the disciplinary division between ethnomusicology and music theory.

The papers in the session are as follows: “Analytical Stories, Ethnography, and Cultural Values” by Yonatan Malin (University of Colorado-Boulder), “Mimicry as Movement Analysis?” by Rosa Abrahams (Northwestern University), “Conception and Performance of Meter in Bulgarian Folk Music” by Daniel Goldberg (Yale University), and “Contextual Theory, or Theorizing between the Discursive and the Material” by Chris Stover (The New School). Each paper will be thirty minutes long, followed by five minutes for questions. After the four papers, respondent Michael Tenzer (University of British Columbia) will share his thoughts on the common themes presented, and the session will be then opened for questions and general discussion.

Analytical Stories, Ethnography, and Cultural Values

Yonatan Malin (University of Colorado Boulder, USA)

This paper uses two vignettes to explore relationships between author-driven analysis and ethnographic encounters. In the first vignette, a song analysis is informed by ethnography and designed, both in content and mode of delivery, to re-inscribe ideas from the culture. This vignette involves the “soul of a *niggun*” (a wordless Hassidic song); the cultural ideas have to do with temporal experience and the relationship between song and prayer. I presented the analysis in a public forum; a video excerpt will be shown and discussed. In the second vignette, I struggle with a tension between anonymous notation in the practice of music analysis and individual orality in the experience of practitioners of Jewish Biblical chant. I analyze elements of improvisation, pacing, dynamics, and timbre in recordings from my fieldwork. I also reflect on the possibilities and limitations of music analysis vis-à-vis personal connections formed through music and ritual.

The larger goal of the paper is to enrich our discussion of methodology in analytical approaches to world music so that it is not only about the terms and methods of representation, but also about the stories that we tell and how they relate to cultural ideas and values.

Mimicry as Movement Analysis?

Rosa Abrahams (Northwestern University, USA)

The analysis of movement to music often stems from examinations of video-recorded events. This allows the analyst an opportunity re-watch, pause, and slow down the movements of their participants. Such analytical practices also lend themselves to the production of notation that appears alongside a score (e.g. Roeder & Tenzer 2012). Unlike prescriptive types of dance notation (e.g. Laban notation method), such transcriptions of movement are intended to be descriptive, and help to illuminate connections between music and movement, especially in the realm of rhythm and meter.

This paper pilots a new technique for rigorous analysis of rhythm and movement, which may be used in ritual settings where video recording is not permissible. By trying to embody worshippers’ movements in relation to the sonic environment, I unearth not only differences between participants, but also an experience of the muscles and space required to complete individual movements. This method affords understandings of movement practices distinct from those garnered from video-recordings. Through a discussion of my mimetic observations in Chicago-based Jewish and Greek Orthodox communities, I address issues of translation bias, and authorship, and explore the types of rhythmic-movement analyses that can be created from unrecorded (live) ethnographic data.

Conception and Performance of Meter in Bulgarian Folk Music

Daniel Goldberg (Yale University, USA)

In this presentation, I bring ethnographic and quantitative methods into productive dialogue to study metric cognition in folk music from Bulgaria. The meter of many Bulgarian folk songs and dance pieces includes beats with two categorically different durations, short and long. Drawing on interviews, instrument lessons, and participation in live performances as a listener and dancer, I discuss how such unequally timed meter is conceived by Bulgarian musicians who play the *tŭpan*, a large, double-sided drum. These observations inform the design of statistical comparisons of onset frequency and timing as measured in recorded *tŭpan* performances, examining the durations between drum strokes in different rhythmic contexts, different types of dance pieces, and performances by different players. In interpreting these statistics, I argue that the relationships between performers' metric conceptions and patterns of performance timing provide a window into the cognition of Bulgarian meter that neither type of evidence can offer in isolation.

Contextual Theory, or Theorizing between the Discursive and the Material

Chris Stover (The New School, USA)

In this paper I present an example of ethical music-theorizing that orients around three concepts Brazilian musicians invoke to describe aspects of their practice. The first, *balanço*, which refers to the microrhythmic fluctuations that determine correct feeling in musical performance, comes from samba. The second, *ginga*, the dynamic physical motion within which improvisational interactions are grounded, comes from capoeira. The third, the *roda*, the protean circle that defines the performance space, locates across both practices. Beginning with these terms, and the constellations of meanings that flow from them, I engage the ways that practitioners think about what they are doing. They also serve as frames for thinking about and analyzing the empirical data of musical performance. I then advance a meta-theoretical concept that I call *circularidade*, which informs some of the reasons that Brazilian musical structures unfold in the ways they do. In other words, terms like *balanço*, *ginga*, *roda*, and more form the basis of my meta-theoretical frame, which in turn accounts in part for why those concepts exist in the way they do. In this way, I stake out an ethical concept-space that begins with, and is sensitive to, the discursive spaces that stem from the practitioners themselves.

Special Session

Analysis of Large Datasets in American Vernacular Religious Music

Scholars have studied American vernacular religious music for nearly a century, but have only recently applied analytical methods to datasets relating to this interdisciplinary field. The papers in this session draw on machine-learning techniques, quantitative music analysis, and music information retrieval to answer new questions about two related aspects of vernacular religious music—folk hymns and shape-note singing—in historical and contemporary settings. A folk hymn is a hymn tune derived from oral tradition. Shape-note singing is group a cappella sacred music that includes some folk hymns and has a distinctive style of music notation and harmonization. *The Sacred Harp* (1844) is the best-known shape-note book and is in wide circulation today. Two sources provide data for the investigation of the tradition. The database “Southern and Western Sacred Music and Influential Sources (1700-1870)” indexes 60,000 sacred music pieces from over 550 sources. *The Minutes and Directory of Sacred Harp Singings* (1995-2015), a record of individuals' song choices at thousands of Sacred Harp singings, provides access to the granular choices made by a geographically dispersed community. These data sources enable these papers' investigations of melodic and harmonic variants, structure in singers' song choices, and correspondences between chosen and historically instructed tempos.

Correlations between the Formal Characteristics of Trans-Atlantic Folk Hymns and Cultural Expression

Nikos Pappas (University of Alabama, USA)

In the 1930s, American scholars of sacred music first identified a particular type of hymn tune that reflected the folk traditions of its area of origin. Labeling these pieces folk hymns, they first associated them with southern sects and denominations that embraced shape-note notation, but later expanded this understanding to include other regions, denominations, and notational systems.

Folk hymns in America display a spectrum of cultural expression that reveals a greater trans-Atlantic history. In particular, folk hymns among English-language denominations differ in origin and process than their German-language counterparts. Among English-language groups many reflect oral dissemination, Germans individual expression based upon printed sources. However, both cultural traditions include tune families, or variant melodic and harmonic settings of related melodies.

The paper discusses the correlation between cultural expression and formal compositional processes through an in-depth study of two folk hymn tune families, a Scottish sacred contrafact and a German chorale tune, as documented in my database “Southern and Western Sacred Music and Influential Sources (1700-1870).” The results of these two inquiries reveal cultural differences in approach and aesthetic, and illustrate the complex relationship between formal elements such as compositional process and origin, form, and melodic variation, and broader cultural expression.

Settings of the Anglo-American Folk Hymn *BOURBON*, 1814-1902

Rachel Hall (Saint Joseph’s University, USA)

Versions of the minor pentatonic folk hymn *BOURBON* appeared, starting in 1814, in nineteenth-century shapenote tunebooks under several titles and arrangements and are in print in hymnals today. Settings of *BOURBON* illustrate a modernizing trend that “corrected” folk polyphony by replacing it with so-called scientific harmony, or triadic functional harmony imported from Europe. Accompanying changes include shifting the melody from the tenor to the soprano line, removing sonorities considered dissonances, and positioning parts on the staff for the convenience of piano accompaniment rather than a cappella singing. Later arrangements demonstrate that minor modality fell out of favor to the point that the tune was reharmonized in the relative major key with the final note falling on the third degree of the subdominant. Theoretical writings of the late 1800s speculate that the disappearance of the minor mode, and minor chords in general, was due to two factors: the greater emphasis on cheerful messages in worship and the use of instruments, which clashed with the sung interpretation of the minor mode in oral tradition. Analysis of the SWASMIS database (Pappas 2015) confirms that the features observed in these settings of *BOURBON* were examples of widespread trends in nineteenth-century Anglo-American sacred music.

Mapping Musical Taste in the Sacred Harp Community

Ian Quinn (Yale University, USA)

Since 1995, the Sacred Harp Musical Heritage Association has collected and published minutes of all-day and multi-day Sacred Harp singings. These minutes record each song sung at each singing, together with the name(s) of the song leader(s) who chose the song. The current dataset records approximately 337,000 songs led at 4,600 singings over a twenty-year period. This study uses principal-components analysis (PCA), an unsupervised machine-learning technique, to find structure in the data, particularly with respect to which kinds of songs tend to be led by which kinds of singers at which kinds of singings.

Because this is an unsupervised learning technique, the computer receives no information about individual songs or singers or singings other than their frequency of co-occurrence. Despite this lack of information, the model learned by the computer is easily interpreted in terms of musical features. The model yields five orthogonal dimensions of variation: musical mode (major/minor), musical complexity (plain/fancy), popularity (mainstream/unusual), and two aesthetic dimensions, one of which strongly relates to what Miller (2008) calls the “Sacred Harp diaspora” and the other of which has to do with generational changes in taste.

Assessing Tempo in Practice: Analyzing the Correspondence of Sacred Harp Tempos to Historical Guidelines Using a Tempo Estimator

Jesse P. Karlsberg (Emory University, USA) and Mark T. Godfrey (Shred Video, Inc., USA)

This study applies a tempo estimation system to recordings of Sacred Harp songs to analyze how tempos selected by practitioners of a decentralized music culture correspond to historical prescriptive instructions for appropriate tempos. Sacred Harp is a cappella singing from an eponymous shape-note tunebook published in 1844. Singers take turns leading songs and have discretion over tempo. Pedagogical introductions in shape-note tunebooks and their precursors since the eighteenth century analyzed by Allen Britton (1949) and Phil Perrin (1968) frequently “indicated an exact tempo” for each “mood of time,” a classification corresponding with time signature. The 1844 Sacred Harp prescribed tempos in seconds per measure for each of the book’s seven moods, though as Britton noted, “whether or not the exact tempos ascribed to the various signs was strictly observed in practice we cannot tell” (239). A 1911 revision to the book’s introduction removed these instructions. Conventional wisdom among singers holds that tempos have increased during the twentieth century. Results from running a customized tempo estimation system on recordings of 3,890 songs confirms contemporary singers sing songs in three moods of time much faster, yet indicates they typically adhere to the previously prescribed tempos for the four other moods of time. Results also reveal quantitative and qualitative differences in variations from average tempos for the different moods of time.

Special Session

Current Trends in Spectral Analysis: A Panel in Honor of Robert Cogan

Panel Co-Chairs: Lawrence Shuster (Purchase College, SUNY, USA) and John Latartara (University of Mississippi, USA)

Seismic Melody/Spectral Sorrow: Simbongsa's Lamentation for Kwaak-ssi from the *Pansori* Epic *Simchung-ga*

Jon Sakata (Phillips Exeter Academy, USA)

While *pansori* scholarship has placed focus on the important, indeed fundamental, role of vocalization techniques (especially vibrato); how discrete vibrato amplitude—amongst a range of parameters—is utilized to express concise poetic imaginaries and cogent design has often escaped analytical understanding. This paper examines how spectral analysis gives a perspective to peer into the diverse and highly particularized role of vocalization techniques in one of the climactic passages of the Korean *pansori* epic *Simchung-ga*. The paper also argues extending “melody” via the lenses of Deleuze’s logic of sensation and seismology: where spectral gestures, phonemic atomization, vibrating spaces constitute

lines of harnessed and unleashed force and color far richer, more complex, and destabilizing than reductive theories based on pitch, rhythm, and contour alone, as well as "vibrato" more commonly applied and understood.

***Khap*, Timbre, and the Non-Lexical Vocabable**

John Latartara (University of Mississippi, USA)

This presentation explores timbral characteristics of the Tai Dam vocal genre *Khap*, focusing on its use of the non-lexical vocabable. The Tai Dam are a distinct ethnic group with communities in Vietnam, Thailand, Laos, Southern China, and Des Moines, Iowa. While a number of studies have been published on the language and culture of the Tai Dam, few have focused specifically on their music. *Khap* is the most important vocal genre for the Tai Dam, performed either solo or accompanied. From original fieldwork conducted in Thailand, Vietnam, Laos, and Des Moines, Iowa, I analyze a variety of *khaki* performances focusing on timbre in relation to non-lexical vocabables. Spectral images are used to visualize the acoustic signal and aid in the timbral discussion.

Perhaps the most interesting aspect of Tai Dam *khap* is the frequent presence of non-lexical vocabables, or wordless sounds, dominated by the “e” vowel, as heard in the English word “her”. Regardless of village, province, or country, these vocabables are consistently present in Tai Dam *khap*. I argue these vocabables function formally as signifiers of phrasal, sectional, and thematic shifts within a performance. The “e” vowel, in particular, emerges as a timbral signpost for listeners, highlighting both the ends and beginnings of phrases and sections, as well as the shift of textual themes. While the “e” vowel is a sonic constant, timbral variety is still achieved through the invention of each individual performer. Indeed, the variety of timbre displayed for the non-lexical vocabables is one of the main determiners for *khap* expertise.

Analyzing Sonic Design in Central Asian Multiphonic Throat Singing: Spectral Sets, Contours, Transformations, and Morphologies

Lawrence Shuster (Purchase College, SUNY, USA)

This paper will develop several new tools and strategies useful for analyzing various aspects of sonic design in Central Asian multiphonic throat singing. Previously, Shuster (2012; 2014) demonstrated how timbral surfaces can be divided into a succession of spectral segments with the contents of each segment being characterized as a distinct spectral set and class. This approach affords an efficient labeling system in which to inventory and compare the diversity of timbral contexts in a performance. Contour theory affords a complementary linear perspective by demonstrating how the individual pathways that connect the harmonics in each successive spectral set combine to create multilinear displays.

By considering the succession of spectral sets within a broader musical space informed by the harmonic series, it is now possible to characterize their succession as a series of transformational functions. Thus, we can not only demonstrate the internal organization of a given spectral set but explicitly define the transformations that map each successive set onto the other. Using an assortment of sonic analysis software applications to measure the loudness and amplitude of individual harmonics within each spectral set, it is possible to demonstrate a profile of spectral morphology by defining change over time. Software applications include Sonic Visualiser, Sygyt, SPEAR, Audacity, and Wavanal. Analytical examples include excerpts from Fedor Tau’s performance of Sygyt.

Synthetic Climates and the (re)Presentation of Japanese Acoustic Ecologies

Michael Gardiner (University of Mississippi, USA)

In this paper, I wish to consider the timbral-formal characteristics of a series of synthetic field recordings, 'Cryptozoon 1–5', by Japanese experimental musician KK Null as representative of a vital, techno-ecological praxis (Guattari 1989). These recordings tend to territorialize full-spectrum sonic landscapes through the activation of extreme frequency ranges in their electro-synthetic elements (between 1–100Hz and 5,000–20,000Hz) sounded both above and below the frequency range of the unaltered field recordings. I argue that Null's compositional technique serves as an exemplar of a phenomenological approach to *fu*□do, the Japanese word for "climate" as philosophized by Tetsuro Watsuji in his book 'Climate and Culture' (1961), a term used to describe the network of environmental and spatial influences that condition human subjectivity. The paper begins by looking at traditional Japanese arts, long associated with nature and its shaping of *ningen* ("humanity") through assemblages that engender interactive spaces of between-ness. Then, insofar as "climate is milieu" (Jantz 2011), that which we always find ourselves in the middle of, I argue that being-in-a-climate today means actively intervening and inscribing various technological tensions into that space. These synthetic inscriptions are fed-back into, and become an integral part of the (sonic) milieu.

Lecture-Demonstration

The Analysis of Microtones in Ottoman/Turkish Maqam Music and Creating a Repertoire on Adjustable Microtonal Guitar

Tolgahan Cogulu (Istanbul Technical University, Turkey) [Session 6b]

The Ottoman/Turkish *makam* music and Anatolian folk music are based on microtones which are pitches less than a half tone. According to an established but highly controversial theory on these microtones, there are 24 unequal tones per octave in Ottoman/Turkish *makam* music. Microtonal pitches are not standard as it is evident in all microtonal folk music traditions of the World. These pitches depend on the performer and instrument. Therefore, two methods have been used by the author: measuring cent values of microtones on traditional Middle Eastern instruments such as *kanun*, *tanbur*, *bağlama* and using pitch histograms for specific melodies. By building up a microtone database from these two methods, a repertoire has been created on the adjustable microtonal guitar, which has movable frets on the fretboard. Analyzed melodies were arranged in a polyphonic way with the related microtones on the guitar. Three of these pieces are uploaded as media files during submission. The analysis of the traditional microtonal melodies, their adaptation into the microtonal guitar and the analysis of the resulting polyphonic pieces will be the focus of this paper.

Workshop

Using a Computer to Transcribe Monophonic Melodies: An Introduction to Praat Speech Analysis Software

Aaron Pettigrew (University of British Columbia, Canada)

Recent research has shown that Praat, "a computer program with which you can analyse, synthesize, and manipulate speech, and create high-quality pictures for your articles and thesis" (Boersma and Weenink 2014), can be adapted for effective use in transcribing and analyzing monophonic melodies. Suvarnalata Rao and Wim van der Meer (2013), for example, have used Praat to create groundbreaking motion transcriptions of Hindustani vocal music; Renee Timmers (2007) has made notable use of the software to compare vocal expression in recorded performances of Schubert songs; and Paolo Bravi

(2016) has recently argued that digital tools like Praat can be very useful for “investigating the relation between the objective tracking of the fundamental frequencies of singing and the subjective perception and musical interpretation of a transcriber” (3).

In this workshop I will show participants how to use Praat as a tool for (ethno)musicological transcription and analysis. I will begin by highlighting some of the more interesting implementations of Praat showcased in recent publications. I will then conduct a simple tutorial: I will introduce the navigation and basic functions of the software, and I will show participants how to create transcriptions of melodic segments. I will describe how users can manipulate various parameters in the software to suit different purposes, explaining relevant theoretical concepts related to pitch recognition and rendering as they arise. I will conclude with a short discussion about the state of the art of automated transcription, briefly introducing other tools (Tony, Melodyne, etc.) and contemplating the advantages and limitations of mechanical and software-enabled approaches for music scholarship in general.

Participants can visit <http://aaronpettigrew.com/files/aawm/> for downloads, including Praat (for Windows, Mac OS, or Linux), installation instructions, and sample music files they can use to follow along on their own laptops.

Posters

A Simple Overview of Musics throughout Gabon

Jeremy Gardent (Museum National d’Histoire Naturelle (MNHN), France) and Sylvie Le Bomin (Museum National d’Histoire Naturelle (MNHN), France)

Musics in Gabon share a number of common features, but reveal a great intrinsic diversity. Most of previous studies on these musics were focused on monographic description or small-scale comparisons. However, increasing knowledge about these musics, as well as intensive fieldwork throughout Gabon now allow a broader comparison of these musics.

We collected first-hand musical and contextual data in 20 ethnonymo-geographical units. These represent 10 ethnonymical groups, distributed in 7 different provinces of Gabon. These analytical recording and musical data were analysed thanks to musical systematics tools.

We compared three categories of data, concerning the internal organization of the sound produced. Metrical organization were studied through the number of beats per period and the type of subdivision of the pulsation. Rhythmical organization were studied through its segmentation in elementary rhythmic cells, and taking the playing context into account. Scales were studied through their interval sequence, the number of scale degrees and the number of semitones they contain.

These data were compared by simple descriptive tools such as graphical representations and map plotting. This gives a first global overview and quantitative assessment of the diversity of Gabonese musics.

Improvisation as Rhetoric within John Coltrane’s Impressions

Jeremy Grall (Birmingham-Southern College, USA)

Like most jazz works, John Coltrane’s Impressions is a piece whose meaning is intrinsically linked to the works that preceded it. In this poster, I analyze John Coltrane’s various types of direct and indirect borrowing from Impressionist composers such as Maurice Ravel, Gabriel Fauré, and Emmanuel

Chabrier, as well as from contemporaries such as Morton Gould, Miles Davis and Ahmad Jamal. Because of how Coltrane borrows from his sources, Impressions forms a musical dialogue in which new musical ideas are presented while older musical ideas are metaphorically refuted within the structure of the work. This ordering of borrowed material will be analyzed within the context of rhetoric models, which thus reveals a coherent narrative structure. These structures form the rhetorical dispositio from which Coltrane elaborately improvises. This improvisation is comprised of both new and additional borrowed material to appeal to the pathos of his audience in a manner that analogous to the *elaboratio* and *decoratio* within rhetorical discourse. This analysis allows us to ask not only what is being said within an improvisation but also how performers choose to use borrowed musical ideas and the constraints from which they improvise new material.

Hypothesis of Polymetric Structures in Afro-Brazilian Music

Gérald Guillot (Iremus, Paris, France and University of Teaching Education, Lausanne, Switzerland)

Due to Atlantic Trade, some “characteristic devices” (Pressing, 2002) would have been inherited from African music by Afro-Brazilian Music. One of these devices is the polymetric structure. While this concept is used by many musicologists, for Western and non-Western music, some authors claim against its existence (Agawu, 2003; London, 2012). Very few studies deal with this potential music property in the Afro-Brazilian repertoire. Thus, this paper relates a preliminary study about the verification of the hypothesis of the presence, in Afro-Brazilian music, of polymetric structures. Several concepts related to meter are evaluated for their application to this musical corpus. Some analyzes based on samples coming from a selection of Afro-Brazilian music (samba, *maracatu de baque virado* and *coco*) are presented. The studies on African and Afro-Brazilian dance, especially the concepts of “polycentrism” (Welsh-Ashante, 2001) and “polymetric lines” (Naveda & Leman, 2008) open promising ways for future investigation on a theoretical plan. Then, an experimental protocol such as Magill & Pressing (1997) will allow to test our hypothesis with a psycho-cognitive approach.

A Flexible Conception of Meter in Pacific Northwest Coast Aboriginal Music

Kristi Hardman (University of British Columbia, Canada)

Ethnomusicologists have long been interested in the relationship between the vocal melody and drumming in North American Indigenous music, but they have often relegated the drum part to a subsidiary role in their transcriptions. In much North American Indigenous music, the drumbeat and the vocal melody seem to be following two different pulse streams, making the music difficult to transcribe in traditional Western rhythmic notation.

From a theoretical standpoint, non-alignment of melody and drumbeat creates problems for conceiving how time should be measured in these songs. In a traditional sense, this music does not have a meter since, in order to determine the meter of a piece, an isochronous pulse needs to be entrained at two or more levels.

In this poster, I propose an alternative method for transcribing North American Indigenous music using onset times and inter-onset durations. The method allows me to more accurately characterize the rhythmic relationship between the voice and drum. By using some analytical approaches, such as Christopher Hasty’s, the underlying regularity of the music becomes apparent. This regularity allows us to establish a meter in a sense that is special to this repertoire, despite its lack of a steady pulse.

The Significance of the Acoustic Signature in Chinese Narrative Performance: New Discoveries Through Praat Acoustic Analysis Software

Francesca Lawson (Brigham Young University, USA) and Shawn Nissen (Brigham Young University, USA)

This Poster explores both a musicological and an acoustical approach to recordings of vocal renditions from two schools of Chinese narrative singing that were differentiated by gender during the first half of the twentieth century: The “male” or Liu school after Liu Baoquan (1869-1942), and the “female” or Luo style after Luo Yusheng (1914-2002). The musicological analysis is based on transcriptions of recordings representing singers from the two schools, comparing melody, rhythm, ornamentation, and tonality. The acoustic analysis compares pitch and duration at the phrase and syllable level for four different recordings (two recordings for each school of singing) using Praat acoustic analysis software (version 6.0.05; Boersma & Weenink, 2015). In addition to the automated voice extraction provided by the Praat analysis software, a visual analysis of the sound waveform is used to calculate the duration of each phrase, syllable, and sound segment to the nearest millisecond. While the original goal of the research was to ascertain subtle differences between male and female vocal performances, the data overwhelmingly demonstrates that the desire of performers to create an individual acoustic signature far outweighs any stated obligation to strictly maintain the vocal traditions of one’s teacher—an obligation that is one of the recognized hallmarks of the Chinese narrative arts. This research concludes that looking into the kinds of nuances detectable through acoustic software enables researchers (1) to discover hidden aspects of performance unattainable through traditional ethnomusicological methods and (2) to underscore the significance of producing a signature voice pattern for a professional singer.

***Kete*: Ashanti Royal Court Drumming from Ghana**

Ben Paulding (Brandeis University, USA)

Recently presented at the 40th Percussive Arts Society International Convention in San Antonio, TX, “*Kete*: Ashanti Royal Court Drumming from Ghana” is based on two years of fieldwork in Kumasi, Ghana, and is derived from the author’s article “*Kete* for the International Percussion Community,” published in 2015 in *Discourses in African Musicology*: J.H. Kwabena Nketia Festschrift. Informed by five years of hands-on training in *Kete* performance with Attah Poku, and by graduate study in ethnomusicology with David Locke, this poster presentation aims to present performing musicians, ethnomusicologists, and musician theorists alike with a practical, pedagogical version of *Ashanti Kete* drumming. After introducing the audience to Nketia and Koetting’s publications on *Kete*, the presentation will closely examine the instruments and the musical content of *Kete*, including characteristic rhythms of each instrument, overall rhythmic design, and scores and analysis of a *Kete* piece called *Abofoo*, including transcriptions and explanations of the lead drumming. The presentation will close with a brief exploration of the creative possibilities of *Kete* rhythms on the drumset. A thorough educational handout, including scores and transcriptions, will ensure the audience leaves with a solid knowledge of *Kete*.

Mathematical Thought and Zoomorphism in the Rhythmic Practice of Carnatic Percussion Performance

N. Scott Robinson (San Diego Mesa College, USA)

Carnatic vocal and instrumental music of South India features many aspects of musical expression devoted to Hindu philosophy. Many of the musical instruments, *raga*, *swara*, compositions, and lyrics are associated with Hindu deities. Numerological and zoomorphic symbolism pervade Carnatic music as expressions of Hindu philosophy. South India’s art music tradition is almost entirely based on vocal music. The pervasive use of Hindu philosophy in Carnatic vocal music is easily identifiable because of

the amount of iconographical and lyrical evidence demonstrating Hindu devotion. Much of the instrumental music in the Carnatic tradition is based on vocal composition tying that repertoire to Hindu philosophy as well.

In sound-based analyses of instrumental Carnatic percussion performance practice, recurring mathematical and zoomorphic phenomena are apparent such as the prevalence of bovine symbolism and rhythmic divisions, subtractions, and additions based on the numbers two, three, and five. In many examples of cadential formulae used in Carnatic percussion music in different *talas*, zoomorphic influence and mathematical thought frequently occur simultaneously. This poster will demonstrate approaches to music analyses of rhythmic phrasing in Carnatic percussion music that shows both evidence of mathematical thought and zoomorphic symbolism.

Rhythmic Analysis of Carnatic Style Percussive Music Using an Adaptive Time Domain Decomposition Method

Konstantinos Trochidis (New York University Abu Dhabi, United Arab Emirates) and Carlos Guedes (New York University Abu Dhabi, United Arab Emirates)

Tempo and meter are important features regarding the structure of a musical composition. Rhythm in most musical cultures is organized based on hierarchical metrical cycles. Most of these metrical cycles can be described using rhythmic events at different metrical levels. This poster explores a novel methodology for the analysis and estimation of short and long-term structures in *ādi tāla* Carnatic style percussive compositions. The proposed approach provides insight into the hierarchical metrical levels of the compositions and their relationships. The methodology is based upon a combination of a novelty function and the Ensemble Empirical Mode Decomposition (EEMD) method. The novelty function computed represents the rhythmic signature of the signal by identifying important rhythmic events in different frequency bands. EEMD is used as a periodicity detection technique to decompose the rhythmic signature of the signal into hierarchically ordered components representing the rhythmic structure of the signal in different time scales. Time-scales close to the tempo and cycle period can be identified and used for tempo and *tāla* estimation respectively. The method is tested on an annotated collection of pieces spanning three different variations of *tāla* compositions and tempi.

Comparative Study of Musical Gestures and Corporeality: The Case of Long-Necked Lutes in Iran and Central Asia

Farrokh Vahabzadeh (Museum National d'Histoire Naturelle (MNHN) and Research Chair, Gestures-Acoustics-Music (GeAcMus), Sorbonne Universités, France)

The geopolitical divisions today distinguish different countries in Central Asia, but it should be noted that between the geo-cultural areas (anthropological, linguistic and musical) the boundaries remain vague. It should be mentioned that many of the studies on the musical traditions carried on the vast area of Iran and Central Asia focus on one region, a particular tradition or a specific geo-cultural area, without undertaking a comparative study of all musical traditions present in this vast zone. However, a comparative approach allows better understanding of singularity in one hand and the common points in another.

This communication approaches the question of musical gesture in a particular angle of the comparative study of the instrumental gestures and the playing techniques, combined with the question of the body. We start with a study of playing techniques of the long-necked lutes (*tār*, *dotār*, *setār*, *rubāb*, *shurangiz* and *tanbur*) from Iran and Central Asia, by trying to define the complete inventory of gestures and techniques used to play these instruments. Our approach focus on the study of instrumental gesture in various contexts of production, ranging from laboratory conditions to field

research in Iran and Central Asia. Our data collection includes interviews with performers, video recordings, 2D and 3D gesture and motion capture and analysis. Our approach uses an adaptation of the methods mainly used in linguistics, especially the paradigmatic analysis, applied to the domain of musical gestures study.

According to our analysis on musical gestures in the playing of the Iranian and the Central Asian lutes, we find a series of common playing techniques but also techniques that are associated with a specific tradition and which can not be found in the other neighbouring cultures. However, each musician develops his own technique to create his own “signature”.

The analysis of the musical gestures can reveal not only the facts concerning interaction between man and the musical instrument but also, at the anthropological level, on how those musical traditions in contact, differentiate one from another by adopting a particular gesture in playing techniques or even a whole separate body posture. So in a broad continuum which includes various musical traditions, or even wider, different cultural areas in contact in the region, some techniques are the “distinctive features” which allows to distinguish between different traditions. These features manifest not only by the particularities in the musical gestures but also by a whole different definition of corporeality and cultural image of the body of the musicians.