

Abstracts of the
International Symposium on
Performance Science 2015

Edited by

AARON WILLIAMON

Royal College of Music, London

and

MASANOBU MIURA

Ryukoku University, Kyoto



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UNIVERSITY

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on Performance Science**

02 | 05 September 2015
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Convened by

Faculty of Science and Technology
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Performance Science 2015**

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Contents

Welcome to ISPS 2015 *page 5*

Scientific committee *page 6*

PROGRAM

Quick reference timetable *page 7*

Wednesday, 02 September 2015 *page 9*

Thursday, 03 September 2015 *page 10*

Friday, 04 September 2015 *page 14*

Saturday, 05 September 2015 *page 19*

WEDNESDAY | 02 SEPTEMBER 2015

Keynote paper

Musical prodigies: Early manifestations, catalysts, and outcomes *page 22*

Gary E. McPherson

THURSDAY | 03 SEPTEMBER 2015

Symposium

The impact of background information on audiences and performers *page 24*

Thematic sessions

Practicing for performance I *page 29*

Insights from dance I *page 32*

Keynote paper

Speaking to the neuromotor system: Learning and refining voluntary movement *page 34*

Janet Karin

Thematic sessions

Practicing for performance II *page 35*

Insights from dance II *page 38*

Poster session I *page 40*

Symposium

Making music for mental health *page 62*

Thematic sessions

Practicing for performance III *page 65*

Movement and gesture I *page 68*

Graduate award paper

Burnout and engagement among music performance students: A quantitative study *page 71*

Anna Zabuska

Thematic session

Movement and gesture II *page 72*

Workshops *page 74*

FRIDAY | 04 SEPTEMBER 2015

Thematic sessions

Musical development *page 80*

Evaluating performance I *page 82*

Methods in performance education *page 84*

Keynote paper

Force control and movement organization in skilled musical performance *page 88*

Hiroshi Kinoshita

Thematic sessions

Performance education I *page 89*

Evaluating performance II *page 92*

Analyzing pianists' movement *page 95*

Poster session II *page 98*

Thematic sessions

Performance education II *page 123*

Performers at work *page 126*

Performance communication *page 129*

Performance education III *page 131*

Performance health and wellbeing *page 133*

Synchrony and timing *page 136*

SATURDAY | 05 SEPTEMBER 2015

Thematic sessions

Performance stress and anxiety *page 140*

Performance expressivity *page 142*

Approaches to improvisation *page 145*

Symposium

Getting past the notes *page 148*

Thematic sessions

Models of performance *page 150*

The performer's body *page 153*

Keynote paper

The power of simplicity: A fast-and-frugal heuristics approach to performance science *page 156*

Markus Raab

Ryukoku University, Kyoto *page 157*

Royal College of Music, London *page 157*

Campus plan *page 158*

ISPS 2015 sponsors *page 159*

Welcome to ISPS 2015

On behalf of Ryukoku University and the Royal College of Music, we are delighted to welcome you to the fifth International Symposium on Performance Science. Convened in Kyoto at Ryukoku University's beautiful Omiya Campus, ISPS 2015 is the largest symposium to date, with approximately 150 spoken papers, poster presentations, and workshops given by leading researchers from around the globe.

The symposium provides an excellent opportunity to discuss and debate the very latest findings in and applications of performance science research, especially along the conference theme *Performance Education*. It also offers a chance to experience first-hand the sites and ancient landmarks of one of the world's great cities. We wish you a productive, enjoyable, and memorable symposium.

Aaron Williamon
Masanobu Miura

Scientific committee

Aaron Williamon, *co-chair*
Royal College of Music, London (UK)

Masanobu Miura, *co-chair*
Ryukoku University, Kyoto (Japan)

Elena Alessandri
Lucerne University of Applied Sciences and Arts (Switzerland)

Werner Goebel
University of Music and Performing Arts, Vienna (Austria)

Fernando Gualda
Federal University of Rio Grande do Sul (Brazil)

Etsuko Hoshino
Ueno Gakuen University (Japan)

Hiroshi Kawakami
Nihon University (Japan)

Satoshi Kobori
Ryukoku University (Japan)

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University of Western Sydney (Australia)

Yutaka Sakaguchi
University of Electro-Communications (Japan)

Takashi Taniguchi
Osaka Gakuin University (Japan)

Minoru Tsuzaki
Kyoto City University of Arts (Japan)

David Wasley
Cardiff Metropolitan University (UK)

Masashi Yamada
Kanazawa Institute of Technology (Japan)

Nozomiko Yasui
National Institute of Technology, Matsue College (Japan)

Quick reference timetable

Wednesday, 02 September 2015

11:00-13:00	Registration	Floor 1, Seiwakan
13:00-13:15	Welcome to ISPS 2015	Floor 3, Seiwakan
13:15-14:15	<i>Keynote address</i> Gary E. McPherson Musical prodigies: Early manifestations, catalysts, and outcomes	Floor 3, Seiwakan
14:15-16:00	Tour of Nishi-Hongwanji	
16:00-17:15	Break	
17:15-19:00	Performances	Floor 9, Avanti Kyoto Hall
19:00-20:00	Reception	Floor 7, Avanti Kyoto Hall

Thursday, 03 September 2015

08:00-08:15	Registration	Floor 1, Seiwakan
08:15-09:45	<i>Thematic sessions</i> The impact of background information on audiences and performers Practicing for performance I Insights from dance I	Room 202, Hokko Room 203, Hokko Room 204, Hokko
09:45-10:00	Break	
10:00-11:00	<i>Keynote address</i> Janet Karin Speaking to the neuromotor system: Learning and refining voluntary movement	Floor 3, Seiwakan
11:00-11:30	Break (with refreshments)	Floor 1, Seiwakan
11:30-13:00	<i>Thematic sessions</i> The impact of background information (<i>cont.</i>) Practicing for performance II Insights from dance II	Room 202, Hokko Room 203, Hokko Room 204, Hokko
13:00-14:15	Lunch	Floor 1, Seiwakan
14:15-15:15	Poster session I	Floor 2, Seiwakan
15:15-16:45	<i>Thematic sessions</i> Making music for mental health Practicing for performance III Movement and gesture I	Room 202, Hokko Room 203, Hokko Room 204, Hokko
16:45-17:00	Break	
17:00-17:45	<i>Graduate award paper</i> Anna Zabuska Burnout and engagement among music performance students: A quantitative study	Floor 3, Seiwakan
17:45-18:45	<i>Thematic sessions</i> Workshop: Beethoven's <i>Grosse Fuge</i> in its various manifestations Workshop: Relating practices in body expression work with singers Movement and gesture II	Floor 3, Seiwakan Room 203, Hokko Room 204, Hokko
18:45-19:45	<i>Thematic sessions</i> Workshop: Music performance teaches concepts and skills in STEM education Workshop: Body sense: Breathing exercises Workshop: Enhancing musical performance with the Feldenkrais method	Floor 3, Seiwakan Room 203, Hokko Room 204, Hokko

Friday, 04 September 2015

08:00-08:15	Registration	Floor 1, Seiwakan
08:15-09:45	<i>Thematic sessions</i> Musical development Evaluating performance I Methods in performance education	Room 202, Hokko Room 203, Hokko Room 204, Hokko
09:45-10:00	Break	
10:00-11:00	<i>Keynote address</i> Hiroshi Kinoshita Force control and movement organization in skilled musical performance	Floor 3, Seiwakan
11:00-11:30	Break (with refreshments)	Floor 1, Seiwakan
11:30-13:00	<i>Thematic sessions</i> Performance education I Evaluating performance II Analyzing pianists' movement	Room 202, Hokko Room 203, Hokko Room 204, Hokko
13:00-14:15	Lunch	Floor 1, Seiwakan
14:15-15:15	Poster session II	Floor 2, Seiwakan
15:15-16:45	<i>Thematic sessions</i> Performance education II Performers at work Performance communication	Room 202, Hokko Room 203, Hokko Room 204, Hokko
16:45-17:00	Break	
17:00-18:30	<i>Thematic sessions</i> Performance education III Performance health and wellbeing Synchrony and timing	Room 202, Hokko Room 203, Hokko Room 204, Hokko
18:30-19:00	Break	
19:00-	Conference dinner	Fortune Garden

Saturday, 05 September 2015

08:00-08:15	Registration	Floor 1, Seiwakan
08:15-09:45	<i>Thematic sessions</i> Performance stress and anxiety Performance expressivity Approaches to improvisation	Room 202, Hokko Room 203, Hokko Room 204, Hokko
09:45-10:15	Break (with refreshments)	Floor 1, Seiwakan
10:15-11:45	<i>Thematic sessions</i> Getting past the notes Models of performance The performer's body	Room 202, Hokko Room 203, Hokko Room 204, Hokko
11:45-12:00	Break	
12:00-13:00	<i>Keynote address</i> Markus Raab The power of simplicity: A fast-and-frugal heuristics approach to performance science	Floor 3, Seiwakan
13:00-13:15	Closing remarks and announcement of ISPS 2017	Floor 3, Seiwakan

Wednesday, 02 September 2015

11:00-13:00	REGISTRATION Floor 1, Seiwakan
13:00-13:15	WELCOME TO ISPS 2015 Floor 3, Seiwakan
13:15-14:15	KEYNOTE ADDRESS Gary E. McPherson Musical prodigies: Early manifestations, catalysts, and outcomes (p.22) <i>Chair:</i> Masashi Yamada Floor 3, Seiwakan
14:15-16:00	TOUR Nishi-Hongwanji Nishi-Hongwanji (Western Temple of the Original Vow) is a temple complex of Jōdo Shinshū established in 1602. It is an historic monument of Kyoto and is listed as a UNESCO world heritage site. <i>Address:</i> Hanayacho-sagaru, Horikawa-dori, Shimogyo-ku, Kyoto 600-8501
16:00-17:15	BREAK
17:15-19:00	PERFORMANCES <i>To feature:</i> STAGE 1 Traditional performance of <i>Bunraku</i> (traditional Japanese puppet theater), including puppetry demonstrations by Awaji Ningyou-Za STAGE 2 Contemporary performance by computer-generated avatars, produced by Naoya Sato, Keishi Aoki, and Hiroshi Kawakami (Nihon University) in collaboration with Penta Ashibuto Floor 9, Avanti Kyoto Hall
19:00-20:00	RECEPTION Floor 7, Avanti Kyoto Hall

Thursday, 03 September 2015

08:00-08:15	REGISTRATION Floor 1, Seiwakan		
08:15-09:45	<p><u>SYMPOSIUM</u></p> <p>The impact of background information on audiences and performers</p> <p><i>Chair:</i> Dawn Bennett Room 202, Hokko</p> <p><u>Bennett, Ginsborg</u> The impact of program notes on audience responses to unfamiliar songs (p.24)</p> <p><u>MacRitchie</u> Using the title as an interpretive tool for newly composed pieces (p.25)</p> <p><u>Blom</u> The composer talks to performers: <i>First Light</i> by Stuart Greenbaum (p.25)</p>	<p><u>THEMATIC SESSION</u></p> <p>Practicing for performance I</p> <p><i>Chair:</i> Peter Miksza Room 203, Hokko</p> <p><u>Carter, Grahn</u> Optimizing music learning: Exploring how blocked and interleaved practice schedules affect advanced performance (p.29)</p> <p><u>Carvalho, Kerr</u> Preliminary approach in the practice of an organ work by undergraduate students: An exploratory study (p.30)</p> <p><u>Duke, Allen, Cash, Simmons</u> Invasion of privacy: Analyses of music practice by artist-teachers and their students (p.31)</p>	<p><u>THEMATIC SESSION</u></p> <p>Insights from dance I</p> <p><i>Chair:</i> Liliana Araújo Room 204, Hokko</p> <p><u>Chua</u> Understanding the role of social support in the talent development of ballet students in Finland and Singapore (p.32)</p> <p><u>Brown, Meulenbroek</u> Dancing together at the same time: Synchronization principles in human motor control (p.33)</p> <p><u>Redding, Aujla et al.</u> Dance aerobic fitness across ten years (p.33)</p>
09:45-10:00	BREAK		
10:00-11:00	<p>KEYNOTE ADDRESS</p> <p>Janet Karin</p> <p>Speaking to the neuromotor system: Learning and refining voluntary movement (p.34)</p> <p><i>Chair:</i> Emma Redding Floor 3, Seiwakan</p>		
11:00-11:30	BREAK (with refreshments) Floor 1, Seiwakan		
11:30-13:00	<p><u>SYMPOSIUM</u></p> <p>The impact of background information (cont.)</p> <p><i>Chair:</i> Dawn Bennett Room 202, Hokko</p> <p><u>Hanrahan</u> The impact of program notes on performers in their performance of vocal music (p.26)</p>	<p><u>THEMATIC SESSION</u></p> <p>Practicing for performance II</p> <p><i>Chair:</i> Cristina Capparelli Gerling Room 203, Hokko</p> <p><u>Evans, McPherson</u> Practice quantity, practice quality, motivation, and their roles in improving performance (p.35)</p>	<p><u>THEMATIC SESSION</u></p> <p>Insights from dance II</p> <p><i>Chair:</i> Catherine Stevens Room 204, Hokko</p> <p><u>Kuno-Mizumura, Ishii et al.</u> Kinematic characteristics of Japanese traditional dance: From cultural significance (p.38)</p>

11:30-13:00	<p style="text-align: center;"><u>SYMPOSIUM</u> (cont.) Room 202, Hokko</p> <p style="text-align: center;"><u>Reimer</u> The effect of the pre-performance talk on audience understanding and enjoyment (p.27)</p> <p style="text-align: center;"><u>Blom, Bennett</u> Composers and their program-note: What do they want the listener to know? (p.28)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u> (cont.) Room 203, Hokko</p> <p style="text-align: center;"><u>Nielsen</u> The teaching and learning of self-regulated practice behavior: Two case studies of studio lessons in jazz/improvised music (p.36)</p> <p style="text-align: center;"><u>Héroux, Fortier</u> Understanding the creative process in the shaping of an interpretation by nine musicians (p.37)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u> (cont.) Room 204, Hokko</p> <p style="text-align: center;"><u>Oyama, Umino, Ozaki</u> Characteristic features of Japanese ballet education: A national survey and comparison with the UK (p.38)</p> <p style="text-align: center;"><u>Quin</u> Questioning efficiency in dance: A confluence of science and somatics? (p.39)</p>
13:00-14:15	<p>LUNCH</p> <p>Floor 1, Seiwakan</p>		
14:15-15:15	<p>POSTER SESSION I</p> <p>Floor 2, Seiwakan</p> <p><u>Aiba, Matsui</u> Behavioral changes in professional pianists during a short period of practice for a new piece (p.40)</p> <p><u>Berg, Cervantes</u> The multimedia composition <i>El sueño ... el vuelo</i>: Its layers of signification and performance (p.41)</p> <p><u>Blom, Bennett, Chong</u> The program note: Information for performer and audience? (p.42)</p> <p><u>Cavitt</u> A comparison of expert and novice error correction task persistence within instrumental music rehearsals (p.43)</p> <p><u>Dalagna, Lã et al.</u> Assessing the artistic ideals in music performance: An exploratory study (p.44)</p> <p><u>Fujinaga, Vigliensoni, Knox</u> The making of a computerized harpsichord for analysis and training (p.44)</p> <p><u>Hamlin</u> Motivation of musical practice (p.45)</p> <p><u>Harvey, Davidson, Nair</u> Motivation, practice, competitive spirit: Australian music undergraduates' performance ability self-perceptions (p.46)</p> <p><u>Hirano, Kinoshita</u> Mouthpiece force in French horn playing (p.47)</p> <p><u>Hirayama</u> The feature of stage fright experienced by music performers: Application of factor analysis for university students (p.48)</p> <p><u>Kumar, Morrison</u> The conductor as musical guide: Gesture and perception of musical content (p.49)</p> <p><u>Lee, Hardwick et al.</u> Integration of fMRI, nEMG, and MIDI data in a professional pianist with focal dystonia (p.50)</p> <p><u>Lisboa, Demos, Chaffin</u> Spontaneity in performance: Effects of thinking on expressive variation in tempo (p.51)</p>		

14:15-15:15	<p style="text-align: center;">POSTER SESSION I (cont.)</p> <p><u>Lisle</u> Alcohol misuse: Prevention and recommendations for alcohol policies in conservatoires (p.52)</p> <p><u>Matsubara, Imoto</u> Towards a collaborative ethnography of chamber music performance (p.52)</p> <p><u>Miura, Fujii et al.</u> Dynamical systems perspectives on rhythmic artistic movements: Evidence from street dancers and drummers (p.53)</p> <p><u>Pfützenreuter</u> Intersections between popular music and art music: Applications of Györgi Ligeti’s divisive rhythms to the modern drumset (p.54)</p> <p><u>Ramirez, Lacey</u> EEG-based classification of music-induced emotions in dancers: A machine learning approach (p.55)</p> <p><u>Shinoda, Sakai et al.</u> Motion feature extraction in the self-training process of Nihon Buyo using motion capture (p.56)</p> <p><u>Sinico, Gerling</u> Assessment criteria for an orchestral excerpt for flute in an audition situation (p.57)</p> <p><u>Stamm, Mühlig</u> Lost in sound: An interview study on the interaction between DJ and crowd (p.58)</p> <p><u>Takeshita</u> Declamation in the songs of Musorgsky: Based on acoustic analysis (p.58)</p> <p><u>Tsuzaki, Ohmori, Ue, Kuga</u> The precision of fundamental frequencies of vocal performances with the parallel voice by the perfect fifth (p.59)</p> <p><u>Vamvakousis, Ramirez</u> A percussive musical interface for a quadriplegic patient (p.60)</p> <p><u>Zorzal</u> Analyzing musical teaching strategies: An observational study in acoustic guitar masterclasses (p.61)</p>		
15:15-16:45	<p style="text-align: center;"><u>SYMPOSIUM</u></p> <p>Making music for mental health</p> <p style="text-align: center;"><i>Chair:</i> Rosie Perkins Room 202, Hokko</p> <p><u>Ascenso, Perkins et al.</u> Making music for mental health: The psychological impact of learning to drum (p.62)</p> <p><u>Fancourt, Perkins et al.</u> Making music for mental health: The biological impact of learning to drum (p.63)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p>Practicing for performance III</p> <p style="text-align: center;"><i>Chair:</i> Paul Evans Room 203, Hokko</p> <p style="text-align: center;"><u>Hooper</u></p> <p>The science of practice: Skill acquisition from a musical perspective (p.65)</p> <p><u>Montovani, Gerling, Santos</u> The effects of sensory feedbacks privation (auditory, kinesthetic, and visual) during the initial approach to piano pieces (p.66)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p>Movement and gesture I</p> <p style="text-align: center;"><i>Chair:</i> Masanobu Miura Room 204, Hokko</p> <p style="text-align: center;"><u>Hofmann</u></p> <p>Finger forces in clarinet playing (p.68)</p> <p><u>Stevens, Mills, Leung, Terry</u> Recognizing whole-body actions: Binding and attention in working memory for movement (p.69)</p>

15:15-16:45	<p><u>SYMPOSIUM</u> (cont.) Room 202, Hokko</p> <p><u>Perkins, Ascenso et al.</u> Making music for mental health: The impact of facilitating community drum workshops (p.64)</p>	<p><u>THEMATIC SESSION</u> (cont.) Room 203, Hokko</p> <p><u>Miksza, Tan</u> Predicting collegiate wind players' practice efficiency, flow, and self-efficacy for self-regulation (p.67)</p>	<p><u>THEMATIC SESSION</u> (cont.) Room 204, Hokko</p> <p><u>Broughton, Davidson</u> An expressive bodily movement repertoire for marimba performance, revealed through observers' Laban effort-shape analyses, and allied musical features: Two case studies (p.70)</p>
16:45-17:00	BREAK		
17:00-17:45	<p>GRADUATE AWARD PAPER</p> <p>Anna Zabuska</p> <p>Burnout and engagement among music performance students: A quantitative study (p.71)</p> <p><i>Chair:</i> Aaron Williamon</p> <p>Floor 3, Seiwakan</p>		
17:45-18:45	<p><u>WORKSHOP</u></p> <p>Floor 3, Seiwakan</p> <p><u>Jacobson</u> Beethoven's <i>Grosse Fuge</i> in its various manifestations: A performer's approach (p.74)</p>	<p><u>WORKSHOP</u></p> <p>Room 203, Hokko</p> <p><u>Oliveira</u> Relating practices in body expression work with singers: Delsarte, Dalcroze, Grotowski, Oida, Chi Kung (p.75)</p>	<p><u>THEMATIC SESSION</u></p> <p>Movement and gesture II</p> <p><i>Chair:</i> Sang-Hie Lee</p> <p>Room 204, Hokko</p> <p><u>He, Kapur, Carnegie</u> Characterizing Guqin <i>Zou Shou Yin</i>: Analyzing physical gesture data of a Guqin performer to categorize sliding tones techniques (p.72)</p> <p><u>James</u> Piano performance: Music, movement, creativity and the affective experience (p.73)</p>
18:45-19:45	<p><u>WORKSHOP</u></p> <p>Floor 3, Seiwakan</p> <p><u>Savage, Hadzikadic</u> Music performance teaches concepts and skills in STEM education (p.75)</p>	<p><u>WORKSHOP</u></p> <p>Room 203, Hokko</p> <p><u>Ollila</u> Body sense: Breathing exercises (p.76)</p>	<p><u>WORKSHOP</u></p> <p>Room 204, Hokko</p> <p><u>Paparo</u> Enhancing musical performance with the Feldenkrais method (p.77)</p>

Friday, 04 September 2015

08:00-08:15	REGISTRATION Floor 1, Seiwakan		
08:15-09:45	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Musical development</p> <p style="text-align: center;"><i>Chair:</i> Tânia Lisboa Room 202, Hokko</p> <p><u>Addessi, Anelli, Benghi, Friberg</u> Does reflexive interaction enhance children's musical improvisation? Child-computer interaction at the beginning stage of music learning (p.80)</p> <p style="text-align: center;"><u>Homburg</u> All in a day's work: The effect of preparation and performance on middle-school honor choir participants' attitudes toward their literature (p.81)</p> <p style="text-align: center;"><u>Hamlin</u> Deliberate practice of high school instrumentalists (p.81)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Evaluating performance I</p> <p style="text-align: center;"><i>Chair:</i> Minoru Tsuzaki Room 203, Hokko</p> <p style="text-align: center;"><u>Lu</u> To read or not to read: Audiences' perception of memorized and non-memorized piano performances (p.82)</p> <p style="text-align: center;"><u>Meals, Morrison, Confredo</u> Effects of temporal congruence on evaluations of conductor efficacy (p.83)</p> <p style="text-align: center;"><u>Mitchell</u> Auditioning the audition: Music performers as expert listeners (p.84)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Methods in performance education</p> <p style="text-align: center;"><i>Chair:</i> Emery Schubert Room 204, Hokko</p> <p style="text-align: center;"><u>Tramma, Lloyd et al.</u> How to improve awareness of the violinist's left hand through Sfilio's method (p.85)</p> <p style="text-align: center;"><u>Forcada-Delgado</u> Good practice in violin pedagogy: Psychological aspects related to the acquisition of motor skills (p.86)</p> <p style="text-align: center;"><u>Paparo</u> Embodying singing in the choral classroom: A somatic approach to teaching and learning (p.87)</p>
09:45-10:00	BREAK		
10:00-11:00	KEYNOTE ADDRESS Hiroshi Kinoshita Force control and movement organization in skilled musical performance (p.88) <i>Chair:</i> Masanobu Miura Floor 3, Seiwakan		
11:00-11:30	BREAK (with refreshments) Floor 1, Seiwakan		
11:30-13:00	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Performance education I</p> <p style="text-align: center;"><i>Chair:</i> Rosie Perkins Room 202, Hokko</p> <p><u>Foletto, Carvalho, Creech</u> Exploring interpersonal communication in one-to-one instrumental lessons: Preliminary results (p.89)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Evaluating performance II</p> <p style="text-align: center;"><i>Chair:</i> Steven Morrison Room 203, Hokko</p> <p style="text-align: center;"><u>Miura</u> How is the proficiency evaluation achieved? Expressive and technical evaluations of piano playing (p.92)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Analyzing pianists' movement</p> <p style="text-align: center;"><i>Chair:</i> Michael Schober Room 204, Hokko</p> <p style="text-align: center;"><u>Lee, Luciano</u> Pianists' hand biomechanics: Heritage and new knowledge (p.95)</p>

11:30-13:00	<p><u>THEMATIC SESSION</u> (cont.) Room 202, Hokko</p> <p><u>Harrison</u> Polymaths, jazz, and sports improvisation: Moving the songwriter from Pro-c to Big-C creativity (p.90)</p> <p><u>Harvey, Davidson, Nair</u> Music undergraduates' usefulness and importance expectations: The Bologna Process from an Australian university perspective (p.91)</p>	<p><u>THEMATIC SESSION</u> (cont.) Room 203, Hokko</p> <p><u>Miyawaki, Miura</u> Commonality and diversity of proficiency evaluation criteria for piano performances between experts and non-pianists (p.93)</p> <p><u>Waddell, Williamon</u> Time to decide: The effects of extra-musical variables on continuous ratings of performance quality (p.94)</p>	<p><u>THEMATIC SESSION</u> (cont.) Room 204, Hokko</p> <p><u>MacRitchie, McPherson</u> Relating continuous hand movement to finger-key contact location in piano performance (p.96)</p> <p><u>Ohsawa, Sawai, Tsuzaki</u> Spatial accuracy in piano performance with and without auditory and visual information (p.97)</p>
13:00-14:15	<p>LUNCH Floor 1, Seiwakan</p>		
14:15-15:15	<p>POSTER SESSION II Floor 2, Seiwakan</p> <p><u>Asakura</u> The effects of the movement of the body to music performance (p.98)</p> <p><u>Aufegger, Wasley, Williamon</u> The stress of performing: Cardiovascular responses to musical performance (p.98)</p> <p><u>Biglari, Sundberg</u> Timbral and melodic characteristics of Persian and Kurdish singing (p.99)</p> <p><u>Cervantes, Berg</u> Modern music and ancient patterns: Interpreting <i>Autumn</i> by Silvia Berg (p.100)</p> <p><u>Citron, Biegon</u> Rediscovering performance in healing: What can we learn from shamans and medicine men? (p.101)</p> <p><u>Duke, Simmons, Allen, Cash</u> The effects of early break tasks and music training on the acquisition and consolidation of simple motor skills (p.102)</p> <p><u>Hatfield</u> Foundations of interventional research in instrumental practice of music (p.103)</p> <p><u>Hawes</u> Negotiating ambiguity: Dynamic structure in Schoenberg songs (p.103)</p> <p><u>Hofmann, Wesolowski, Goebel</u> Rotating the groove: Participatory discrepancies with varied personnel in jazz trio performance (p.104)</p> <p><u>Homburg</u> Performing matters: Documenting the effect of musical performance using the continuous response digital interface (p.105)</p> <p><u>Homburg, Lucas</u> Real men sing: Understanding male self-efficacy and the choice to participate in vocal music (p.106)</p> <p><u>Kawase, Obata</u> What attracts an audience's visual attention? An eye tracking study (p.107)</p>		

14:15-15:15	<p style="text-align: center;">POSTER SESSION II (cont.)</p> <p><u>Kerr, Carvalho</u> Introduction to arts content learning in a distance learning education course (p.108)</p> <p><u>Kitamura, Ohtani</u> Measurement of vibration on foreheads of soprano singers during singing (p.109)</p> <p><u>Kobori</u> Memorizing musical score processes during piano and guitar performance: An eye movement study (p.110)</p> <p><u>Mito, Kawakami et al.</u> A comparison of performance motion related to emotional valence between grand piano and keyboard playing (p.111)</p> <p><u>Murakami</u> Resonance of mimicry: Media artistic approaches to body image of developmental disorder (p.111)</p> <p><u>Okada, Miura</u> Investigation of factors of ambiguity in tempo perception using musical variations (p.112)</p> <p><u>Prado</u> The <i>Way</i> of singing: The Dionysian and the Apollonian in the learning process (p.113)</p> <p><u>Reimer</u> The use of social media, reality TV, and pop culture in training character development in young opera singers (p.114)</p> <p><u>Sakaguchi, Aiba</u> An analysis of breath timing in piano playing (p.115)</p> <p><u>Santos, Gerling</u> Guarnieri's <i>Ponteio 45</i>: A comparison of tempo and intensity variations between professional pianists and graduate students (p.116)</p> <p><u>Shibuya, Morita et al.</u> The relation between a puppet's action and puppeteer's breathing phases in Bunraku (p.117)</p> <p><u>Sinico</u> Basic technique and tone development for beginning flute students: A teaching experience report (p.118)</p> <p><u>Siwiak, Kapur, Carnegie</u> Micro-timing as a feature for investigating musicality (p.118)</p> <p><u>Takahashi, Oura</u> The cognitive skills used when listening to musical harmonies among jazz musicians (p.119)</p> <p><u>Umata, Nagisa, Sakai, Ogawa</u> Correlation analysis among children's music improvisation, the measure of creative thinking in music, and the Big Five personality traits (p.120)</p> <p><u>Wang, Lin, Lin</u> Performance-related musculoskeletal disorders: Chinese opera performance training (p.121)</p> <p><u>Zorzal</u> Brazilian acoustic guitar students in masterclasses: A preliminary profile study (p.122)</p>
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15:15-16:45	<p><u>THEMATIC SESSION</u> Performance education II</p> <p><i>Chair:</i> Paul Evans Room 202, Hokko</p> <p><u>Hay</u> Code clashes in drama education (p.123)</p> <p><u>Misenhelter</u> Beliefs, obligations, and evolving identity: The roles of performance in tertiary music education curricula (p.124)</p> <p><u>Morijiri</u> Developing the musicians: How teachers can contribute to professionalism (p.125)</p>	<p><u>THEMATIC SESSION</u> Performers at work</p> <p><i>Chair:</i> Liliana Araújo Room 203, Hokko</p> <p><u>Aujla, Farrer</u> Experiences of independent dancers: Motivation and mental skills (p.126)</p> <p><u>Lisle</u> Work-life imbalance: The impact on health and wellbeing of performers (p.127)</p> <p><u>Spencer</u> How should current performer training methods and content adapt in response to the evolving professional work environment? (p.128)</p>	<p><u>THEMATIC SESSION</u> Performance communication</p> <p><i>Chair:</i> Sang-Hie Lee Room 204, Hokko</p> <p><u>Fujinami, Hidaka, Kashyap</u> Evaluating presence based on balance (p.129)</p> <p><u>Ginsborg, Bennett</u> Developing familiarity: A new duo's individual and shared practice features and performance cues (p.129)</p> <p><u>Blom, Hanrahan, Reimer</u> Consenting adults: Composer-performer collaboration in the composition process (p.130)</p>
16:45-17:00	BREAK		
17:00-18:30	<p><u>THEMATIC SESSION</u> Performance education III</p> <p><i>Chair:</i> Peter Miksza Room 202, Hokko</p> <p><u>Rink, James</u> Cross-cultural perspectives on the creative development of choirs and choral conductors (p.131)</p> <p><u>Dalagna</u> Promoting self-authorship: A complementary approach to teaching music performance in higher education (p.132)</p>	<p><u>THEMATIC SESSION</u> Performance health and wellbeing</p> <p><i>Chair:</i> Daisy Fancourt Room 203, Hokko</p> <p><u>Biegon, Citron, Alon, Czerniak</u> Use of performance tools to improve outcome of medical treatment: Manipulating the placebo response in experimental pain (p.133)</p> <p><u>Steinmetz, Zeh, Delank, Peroz</u> Symptoms of craniomandibular dysfunction in professional orchestra musicians (p.134)</p> <p><u>Trouli</u> Focal Dystonia in pianists: Is there a crucial early clue? (p.135)</p>	<p><u>THEMATIC SESSION</u> Synchrony and timing</p> <p><i>Chair:</i> Jennifer MacRitchie Room 204, Hokko</p> <p><u>Bishop, Goebel</u> Ready, set, go: Mapping the gestures used to cue entrances in duo performance (p.136)</p> <p><u>Moelants, Nijs, Leman</u> Development of timing through instrumental practice (p.137)</p> <p><u>Keller, Koenig</u> Effects of metric structure on musical ensemble coordination: A study with the St Thomas Choir of Leipzig (p.138)</p>
18:30-19:00	BREAK		

19:00-	<p style="text-align: center;">CONFERENCE DINNER</p> <p style="text-align: center;">Fortune Garden</p> <p>Located in bustling central Kyoto, Fortune Garden opened in 2012 on the ground floor of the former headquarters of Shimadzu Corporation, designed by one of the most influential modern architects of Japan, Goichi Takeda.</p> <p style="text-align: center;"><i>Address:</i></p> <p style="text-align: center;">386-2 Ichinofunairi-cho, Nijo-Kudaru, Kawaramachi-dori, Chukyo-ku, Kyoto 604-0924</p>
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Saturday, 05 September 2015

08:00-08:15	REGISTRATION Floor 1, Seiwakan		
08:15-09:45	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Performance stress and anxiety</p> <p style="text-align: center;"><i>Chair:</i> Jane Ginsborg Room 202, Hokko</p> <p style="text-align: center;"><u>Facchini, Harper et al.</u> Music performance anxiety: Learning from long-term duos (p.140)</p> <p style="text-align: center;"><u>Mor</u> Onstage in front of all these people: A grounded theory of artists' performance stress (p.141)</p> <p style="text-align: center;"><u>Osborne</u> Building performance confidence in the developing musician (p.141)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Performance expressivity</p> <p style="text-align: center;"><i>Chair:</i> Emery Schubert Room 203, Hokko</p> <p style="text-align: center;"><u>Miyamoto, Miura</u> Role of musical features that elicit emotional musical audio (p.142)</p> <p style="text-align: center;"><u>Ramirez, Giraldo</u> Technology-enhanced expressive music performance learning: A machine-learning- based tutoring tool (p.143)</p> <p style="text-align: center;"><u>Sakino, Hamano et al.</u> The influence of expressive accompaniment on a player's emotion and expressive nuances in a percussive duo performance (p.144)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Approaches to improvisation</p> <p style="text-align: center;"><i>Chair:</i> Aaron Williamon Room 204, Hokko</p> <p style="text-align: center;"><u>Pras, Schober, Spiro</u> Creative processes and shared understanding in free jazz improvisation: A case study (p.145)</p> <p style="text-align: center;"><u>Schober, Spiro</u> To what extent do listeners share performers' interpretations of jazz improvisations? (p.146)</p> <p style="text-align: center;"><u>Varvarigou</u> Facilitating improvisation through group ear playing in higher education (p.147)</p>
09:45-10:15	BREAK (with refreshments) Floor 1, Seiwakan		
10:15-11:45	<p style="text-align: center;"><u>SYMPOSIUM</u></p> <p style="text-align: center;">Getting past the notes</p> <p style="text-align: center;"><i>Chair:</i> Andrew Homburg Room 202, Hokko</p> <p style="text-align: center;"><u>Homburg</u> Getting off the ground: Building performance skills in beginning music learners with multiple modes of instruction (p.148)</p> <p style="text-align: center;"><u>Farrell</u> Getting to instruction that works: Comparing and contrasting ensemble and applied instruction (p.148)</p> <p style="text-align: center;"><u>Lucas</u> Getting beyond the page: The use of multiple modes of instruction with ensembles of varying ages and musical experience (p.149)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">Models of performance</p> <p style="text-align: center;"><i>Chair:</i> Peter Keller Room 203, Hokko</p> <p style="text-align: center;"><u>Giraldo, Ramirez</u> Computational modeling of ornamentation in jazz guitar music (p.150)</p> <p style="text-align: center;"><u>Umino, Soga, Yazaki, Hirayama</u> Choreographic education for contemporary dance using 3D motion data (p.151)</p> <p style="text-align: center;"><u>Schubert, Rodà et al.</u> Algorithms can mimic human piano performance: The Deep Blues of music (p.152)</p>	<p style="text-align: center;"><u>THEMATIC SESSION</u></p> <p style="text-align: center;">The performer's body</p> <p style="text-align: center;"><i>Chair:</i> David Wasley Room 204, Hokko</p> <p style="text-align: center;"><u>Shoda, Sakata, Williamon</u> Heart-rate variability and complexity in live violin performance (p.153)</p> <p style="text-align: center;"><u>Biglari, Berglund</u> Tone repetitions in Persian and Kurdish singing: In search for Caccini's Trillo (p.154)</p> <p style="text-align: center;"><u>Ota, Aoki</u> Electromyographic activity of facial muscles in flute playing: Muscle activity and its cooperativeness (p.155)</p>

11:45-12:00	BREAK
12:00-13:00	KEYNOTE ADDRESS Markus Raab The power of simplicity: A fast-and-frugal heuristics approach to performance science (p.156) <i>Chair:</i> Minoru Tsuzaki Floor 3, Seiwakan
13:00-13:15	CLOSING REMARKS and ANNOUNCEMENT OF ISPS 2017 Floor 3, Seiwakan

Wednesday
02 September 2015

Keynote Paper

MUSICAL PRODIGIES: EARLY MANIFESTATIONS, CATALYSTS, AND OUTCOMES

Gary E. McPherson¹*

¹ Melbourne Conservatorium of Music, University of Melbourne, Australia

* Correspondence: g.mcpherson@unimelb.edu.au

Main contribution

One of the most contentious debates in psychology, education, biology, and other related disciplines centers on the source of exceptional ability. To what extent can the remarkable achievements of eminent musicians, intellectuals, visual artists, writers, and so on be explained through “nature” (genetic endowment) or “nurture” (the environment)? How can these achievements, regardless of their source, be identified and fostered?

In my presentation, I address fundamental issues surrounding the nature/nurture debate in music and, in doing so, scrutinize much of the folklore that typically accompanies remarkable achievement in music. Using François Gagné’s differentiated model of giftedness and talent, I outline a broad structure that distinguishes between domains of ability (*gifts*) and fields of performance (*talent*). The bulk of my presentation provides examples of the natural abilities, environmental and intrapersonal catalysts, and developmental processes that lead to different types of musical talent as represented in the extraordinary rapid development of musical prodigies.

The explanation I provide builds on my research across 30+ years as a music educator and researcher that has been devoted to studying children’s musical development and the small pool of children within this population we distinguish as musical prodigies who display extraordinary musical abilities. Included also is a survey of the breadth of insights provided in my most recent OUP edited volume—*Musical Prodigies: Interpretations from Psychology, Education, Musicology, and Ethnomusicology*—which addresses the dearth of scientific literature that is available on musical prodigies, as compared with studies that seek to explain other areas of human accomplishment such as expertise, talent, and genius.

Importantly, the presentation concludes by showing examples of how the various facets described during my presentation form a distinct and unique choreography of interactions that is unique for each child. As part of this explanation I provide a hypothetical explanation of the facets that are believed to contribute most to the emergence and nurturing of musical prodigiousness. Since much of the existing literature is based on little more than anecdotal support, an important part of this explanation describes issues that would benefit from empirical confirmation of the ideas expressed in my presentation.

Keywords

musical prodigy; musical development; prodigiousness; giftedness; talent

Acknowledgments

My presentation is partly derived from information obtained in the co-authored opening chapter by François Gagné and Gary E. McPherson for an Oxford University Press (2016) book entitled *Musical Prodigies: Interpretations from Psychology, Education, Musicology, and Ethnomusicology*. The presentation also includes information from other chapters in this publication and the presenter’s own research.

Thursday
03 September 2015

Symposium

The impact of background information on audiences and performers

THE IMPACT OF PROGRAM NOTES ON AUDIENCE RESPONSES TO UNFAMILIAR SONGS

Dawn Bennett^{1} and Jane Ginsborg²*

¹ Research and Graduate Studies, Curtin University, Australia

² Center for Music Performance Research, Royal Northern College of Music, UK

* Correspondence: d.bennett@curtin.edu.au

Background

Program notes, commentaries, and descriptions invariably feature in classical music concerts, yet little is known about their impact on the listener. Margulis found that text descriptions reduce listeners' enjoyment of music. While excerpts from Beethoven string quartets—which may or may not have been familiar to participants, at least in terms of their genre—were used in her study, descriptions are arguably more helpful to listeners when the works performed are novel to listeners, including songs in unfamiliar languages.

Aims

The study aimed to understand the impact of oral descriptions on audiences' listening experiences.

Method

Participants of varying musical experience and expertise attended informal concerts in Australia and England. The performers were the researchers: a soprano and violist. This was a qualitative study. An ethnographic approach based on Ferrara was used to analyze audience members' responses to performances of two rarely performed Boris Tchaikovsky settings of Rudyard Kipling poems, sung in Russian.

Listeners were given only the song titles before the first performance. A second performance followed a brief oral program note and translation of the lyrics. After each performance, listeners completed a questionnaire asking open-ended questions about their listening experiences.

Analysis involved "naturalistic" coding that started with readings of each response. Provisional categories were developed using a constant comparative analytical scheme to form units of information. Further readings allowed for the emergence of new categories and some thematic reduction.

Results

Initial findings from Australia suggest that listeners' musical experience influences the impact of oral descriptions and translations of lyrics. Specifically, listeners with less musical experience focussed on ontological meaning, and the ontological meanings of more experienced listeners were often informed by musical elements (semantic meaning). Once they had additional information, less experienced listeners made semantic and/or syntactical relationships and adjusted their thinking to align with the known meaning, whereas more experienced listeners often referred to their original meanings.

Conclusions

The findings extend those of Margulis with the addition of open-ended data, providing deeper understanding of listeners' experiences. Findings will be discussed in relation to oral descriptions, understanding of lyrics, and musical experience.

Keywords

ethnography; experience; listening; lyrics; music

USING THE TITLE AS AN INTERPRETIVE TOOL FOR NEWLY COMPOSED PIECES

Jennifer MacRitchie^{1,2*}

¹ MARCS Institute, University of Western Sydney, Australia

² Conservatorio della Svizzera Italiana, University of Applied Sciences and Arts of Southern Switzerland, Switzerland

* Correspondence: j.macritchie@uws.edu.au

Background

In performing newly composed music (and notated music in particular), musicians may find they have to construct an interpretational platform before the process of reading and creating an interpretation of the score can commence. Information used to construct this platform may include biographical information about the composer, references to other works by the same composer or by contemporaries, listening to available recordings, and gaining feedback on performances. However, young performers in particular often approach newly composed pieces without any prior knowledge regarding the composer and/or experiences of performing other contemporary repertoire from which they can draw inspiration. What remains is the information contained in the score, and the information contained in the title of the work.

Aims

This study aimed to investigate the influence of the information contained in the title of a newly composed work on the interpretation, particularly in the case of young performers.

Method

Two case studies are presented in the form of two specially-composed pieces. These were given to three pianists to prepare for performance at a series of public concerts. The performers, all with limited contemporary performing experience, received no extra information in addition to the notated score, with the exception of the title and legends for the piece. Individual semi-structured post-performance interviews were conducted, with questions focusing on hierarchical levels of interpretation, from single sounds to overall structural narratives. The transcribed interviews were analyzed and coded in relation to these hierarchical themes. Particular responses referencing the title information were then further separated.

Results

The first piece (*Chippings*) was titled in reference to the group of different timbres the composer intended the performer to produce through the use of different parts of the piano. As such, the performers spent a large amount of rehearsal time aiming to distinguish the timbres of the different sections. In terms of an overall narrative, they talked about the piece regarding the juxtaposition of these different sounds. The information afforded by the title of the second piece (*An Echo at Waldau*, in reference to a psychiatric clinic situated in Bern, Switzerland), inspired performers to imbue their performance with feelings of tension, with particular references to mental conditions and imagery of psychiatric institutions.

Conclusions

The title of a composition affords the performer a basis for interpretation. From our study of young performers, we saw that these interpretations may be developed in line with the guidance the title provides, e.g. describing how the sounds of a piece should be interpreted, or connecting the music to an image or location. Although this does not preclude the performer from developing an interpretation that considers all aspects of the composition, it may help to draw focus to a particular element of the music.

Keywords

interpretation; contemporary music; communication; composer; performer

THE COMPOSER TALKS TO PERFORMERS: *FIRST LIGHT* BY STUART GREENBAUM

Diana Blom^{*}

¹ Music, University of Western Sydney, Australia

* Correspondence: d.blom@uws.edu.au

Background

Schoenberg is, famously, purported to have said: "The performer, for all his intolerable arrogance, is totally unnecessary except as his interpretations make the music understandable to an audience unfortunate enough not to be able

to read it in print.” Yet composers value performers’ interpretations of their music, and performers often seek a composer’s insights into a work. This presentation discusses the thinking of Australian composer Stuart Greenbaum in relation to his solo piano work *First Light* (1997).

Aims

The aim of this research was to investigate which aspects of the work the composer discussed and how this information might inform a performer’s preparation of the piece.

Method

The composer was interviewed face-to-face by the researcher, a pianist, who had performed and recorded *First Light* for commercial CD release before the interview. This gave the interview a strongly practice-based focus, with questions emerging from the research-pianist’s own experience with the work. The transcribed interview was analyzed and coded, firstly in relation to the topics raised in the questions, then again to reveal other emerging themes.

Results

Greenbaum considered the work cross-cultural because of jazz, minimalist, and romantic influences. Harmonic influences from the cross-cultural mix were analyzed and intertextuality in relation to other works of his was highlighted. In his discussion of texted aspects of the score—the title, the dedication to his mother, the front of score note, and markings in the score—Greenbaum offered the performer some freedom with pedaling and with some rhythmic devices within a frame-of-reference of stylistic influences. The composer described how dynamics shape the long, slow-building climaxes in the work.

Conclusions

Stylistic influences, texted score aspects, compositional process, and composer views on performing the work offer, to a pianist preparing the work, interpretation possibilities for consideration and a deeper understanding of the work.

Keywords

composer; pianist; communication; style; interpretation

THE IMPACT OF PROGRAM NOTES ON PERFORMERS IN THEIR PERFORMANCE OF VOCAL MUSIC

Kevin Hanrahan^{1*}

¹ Glenn Korff School of Music, University of Nebraska–Lincoln, USA

* Correspondence: khanrahan2@unl.edu

Background

Program notes have long been a staple for concert audiences; however, little research has been conducted on their impact on performers, specifically, program notes written by performers as they prepare for a performance. Based in the concept of practice-led research, the practice of performers writing program notes may be useful to them as they prepare for a performance. By “talking” about their work the performers engage in what Carter called material thinking: “that simple but enigmatic step, joining hand, eye and mind in a process of material thinking.” Through the engagement of material thinking, and writing program notes that are both detailed and academic and then those that are simple and succinct, performers can deepen their own understanding of their artistry, improve the specificity of their performance, communicate more effectively with the audience, and ultimately improve the experience for all.

Aims

The study aimed to understand the impact of first constructing detailed program notes and then simplifying them for an audience based on the performance experience of singers.

Method

Participants, collegiate level students preparing for degree recitals, constructed detailed program notes for pieces to be performed on the recital. These notes contained historical information, musical analysis, and interpretation. The participants then revised the notes for an audience, using the criteria outlined by Mabry to focus their thinking. Finally, the participants responded to a survey in which they described and rated the impact of both the detailed and revised program notes on their performance.

Results

This study is in its early stages. It is expected that there will be at least some positive benefit from the writing of program notes.

Conclusions

The findings will highlight the positive and negative effects of writing program notes on the performer with recommendations for implementation in the teaching studio.

Keywords

program notes; performance notes; experience; singing; music

THE EFFECT OF THE PRE-PERFORMANCE TALK ON AUDIENCE UNDERSTANDING AND ENJOYMENT

*Jamie Reimer¹**

¹ Glenn Korff School of Music, University of Nebraska–Lincoln, USA

* Correspondence: jreimer2@unl.edu

Background

The effort to help audiences understand and enjoy repertoire presented in concert programs is a longstanding challenge to the performance community. Performers take great time and care to understand the works they present onstage, and it is assumed that audiences appreciate having the same background knowledge or historical context for concert repertoire as the performer. It is taken for granted that audiences want or need to know why a piece of music was composed. Jacobs suggested that it may be more beneficial to provide a setting in which to discuss the performance afterward.

Aims

This study was designed to evaluate the impact of the pre-performance talk on the audience's understanding and enjoyment of a concert performance.

Method

Surveys will be distributed to selected audience members at five Spring 2015 pre-performance talks for performances at the university, professional, and community levels. Audience members will be asked to rate how their concert experience was impacted by the pre-performance talk on a rated scale, as well as provide comments about their observations.

Analysis will be inductive in nature and will involve multiple readings of the responses to generate themes. This paper focuses on responses to the following questions:

- (1) Why did you attend the pre-performance talk?
- (2) Did the pre-performance talk enhance your concert experience in a positive way?
- (3) Would you attend another pre-performance talk? Why or why not?
- (4) Would you prefer to have the same information provided in a written format (e.g. a program note)?
- (5) Would you prefer to have a post-concert discussion instead of a pre-performance talk?

Conclusions

This paper will attempt to conclude whether or not pre-performance talks are of value to concert audiences. It will address reasons for attendance at pre-performance talks, the impact on the audience's enjoyment and understanding of the music performed, and possible alternative methods for sharing the same information with audience members.

Keywords

pre-performance talk; concert; audience; listener

COMPOSERS AND THEIR PROGRAM-NOTE: WHAT DO THEY WANT THE LISTENER TO KNOW?

Diana Blom¹ and Dawn Bennett^{2}*

¹ Music, University of Western Sydney, Australia

² Research and Graduate Studies, Curtin University, Australia

* Correspondence: d.bennett@curtin.edu.au

Background

Program notes for classical music listeners include short descriptions and commentaries. In one study it was found that, while participants preferred listening without these descriptions, listeners new to contemporary music may benefit from a descriptive note. Many composers write their own program notes, and it has been noted that some write about thoughts and feelings effectively while others mystify the listener.

Aims

This paper reports from a study working with composers to understand how and why they create program notes.

Method

Five composers responded to a questionnaire about new music for viola and piano, curated and performed/recorded by the researchers. Analysis involved multiple readings of responses to generate themes. This paper focuses on responses to two questions: (1) how do you go about writing a program note, and (2) what do you include, and why?

Results

Of the five composer respondents, four wrote their program-notes for listeners only and one for both listeners and performers. Four wanted the listener to become engaged in the music through the program note. All five included background information such as their general inspiration for the piece, a commissioner's brief, and the initial concept. Composers' program notes often started with the title and what it referenced. They then discussed any intertextuality in the piece and drew in musical and extra-musical connections, though not intending it to be a "program" for listening to the piece. One composer noted that too much personal information is tiresome and two included technical information.

Conclusions

All respondents sought a balance between different types of information and were concerned about engaging the listener while not "locking them in" to a way of listening. Composers' interest in providing background information, thoughts, and feelings about their works marries with the literature on descriptions and commentaries; however, they believed that personal details about the composer should be sparse or avoided. Two composers included compositional thinking (technical) in their notes and one composer related this thinking to the ideas expressed in the music.

As Burkat hinted, engaging the listener may relate as much to the effectiveness of the writing style as it does to the content. Further research needs to analyze the thinking of composer, performer, and listener with respect to program note samples of contemporary classical music. And university performance and composition students would benefit from exercises which develop thinking about the how, what, and why of program notes they write.

Keywords

program-note; contemporary classical music; composer; listener

Thematic session

Practicing for performance I

OPTIMIZING MUSIC LEARNING: EXPLORING HOW BLOCKED AND INTERLEAVED PRACTICE SCHEDULES AFFECT ADVANCED PERFORMANCE

Christine Carter^{1*} and Jessica A. Grahn²

¹ School of Music, Memorial University of Newfoundland, Canada

² Department of Psychology; Brain and Mind Institute, Western University, Canada

* Correspondence: christinec@mun.ca

Background

Repetition is the most commonly used practice strategy by musicians. Although repeating the same material during blocks of practice time continues to be suggested in the pedagogical literature, work in the field of cognitive psychology suggests that repeated events receive less processing, thereby reducing long-term learning. Alternative practice strategies are offered by motor skill learning and sport psychology research. Instead of using a blocked practice schedule, with practice dedicated to one task before moving to the next task, an interleaved schedule can be used, in which practice is frequently alternated between tasks. This frequent alternation involves more effortful processing, resulting in increased long-term learning.

The finding that practicing in an interleaved schedule leads to better retention than practicing in a blocked schedule has been labeled the “contextual interference effect.” While the effect has been observed across a variety of fields, few studies have examined this phenomenon in music learning despite the clear potential application to music practice. The existing studies have produced mixed results, suggesting further exploration is necessary.

Aims

The current study extends existing research on the contextual interference effect in the context of learning music. Whereas previous studies in music have used short musical stimuli (e.g. seven notes to eight measures) and short practice sessions, the current study used longer musical stimuli taken from preexisting musical sources (e.g. concerto expositions and technical exercises) and longer practice sessions in order to provide a more ecologically valid practice environment. In addition, this study controlled for individual differences by employing a within-subjects design (all participants experienced both practice conditions), rather than the between-subjects design used in earlier research. Finally, we asked three different expert raters to rate participants’ performance recordings, in order to assess overall improvement, rather than limiting assessment to pitch accuracy.

Method

This study compared the effects of blocked and interleaved practice schedules on advanced clarinet performance. Ten clarinetists were given one concerto exposition and one technical excerpt to practice in a blocked schedule (twelve minutes per piece) and a second concerto exposition and technical excerpt to practice in an interleaved schedule (three minutes per piece, alternating until a total of twelve minutes of practice were completed on each piece). Participants sight-read the four pieces prior to practice and performed them at the end of practice and again one day later. The sight-reading and two performance run-throughs of each piece were recorded and given to three professional clarinetists to rate.

Results

Overall, whenever the ratings of performance differed between blocked and interleaved conditions, the pieces practiced in the interleaved schedule were rated better than those in the blocked schedule, although results varied across raters. Participant questionnaires also revealed that the interleaved practice schedule had positive effects on factors such as goal setting, focus, and mistake identification.

Conclusions

An interleaved practice schedule may be a more effective practice strategy than continuous repetition in a music-learning context. Potential for widespread application exists, particularly as interleaved practice may reduce repetitive strain injuries among musicians.

Keywords

practice; performance; learning; training; contextual interference effect

Acknowledgments

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PRELIMINARY APPROACH IN THE PRACTICE OF AN ORGAN WORK BY UNDERGRADUATE STUDENTS: AN EXPLORATORY STUDY

*Any Raquel Carvalho** and *Dorotéa Kerr*²

¹ Graduate Music Program, Federal University of Rio Grande do Sul, Brazil

² Department of Music, Paulista State University *Júlio de Mesquita Filho*, Brazil

* Correspondence: anyraque@cpovo.net

Background

Since practice activities form the core of every performer's work, students who still depend on a teacher's guidance can benefit from learning how to construct efficacious practice sessions. In order to do so, they must first understand how they actually approach a piece. Research reported in the literature has described a typology of instrumental student practice. How their practice is organized can predict the quality of performance. Taking into account the Brazilian higher education context, it is worth identifying how organ students organize their practice. Where do they start? By trying out the piece? With analysis? What types of procedures do they employ? How do they plan their practice time? These questions motivated the study.

Aims

The goal of this study was to investigate the initial stages of practice through the observation of the first practice session of four organ students. This manuscript reports partial results of broader research devoted to mapping Brazilian organ students' practice aiming at extracting, systematizing, and proposing tools for enhancing the quality of their practice.

Method

Four volunteer undergraduate organ students (mean age=38 years, ranging from 25 to 61; all male) from the same university were asked to study an organ work (*Small excerpt for the Christmas season* by Furio Franceschini) in a 40-minute video recorded session. At the close of the session, a semi-structured interview was conducted. The observation of practice was described and the interviews were transcribed. Data were categorized in two broad groups: "playing practice" and "non-playing practice" activities.

Results

The observation of the practice allowed identifying ca. 15-20 different ways of practicing such as "playing with the right hand," "writing down fingering on the score," "trying chord sonority," etc. Three students initially examined the score briefly to see what sort of events occurred. They immediately realized it was an accompanied melody, and two of them proceeded in studying the piece in this manner. The third spent most of the time working out fingering and trying out phrases. The fourth student confessed to only seeing what key the piece was in and then practicing hands only, each isolated, then together. The pedal part was not included in his allotted time study.

Conclusions

Students have shown that they have individualized ways of approaching a new piece, even though the procedures are basic and common in instrumental practice. Two of the students demonstrated similar practice organization: a quick overview based on an analytical approach, playing it through to recognition, followed by practice of the parts. One student used repetition based on the trial-and-error approach. The fourth student spent the majority of time writing out fingering (after a quick analysis), thus using tools of analytical practice. None of the students referred to the title as important.

Keywords

instrumental practice; organ practice; undergraduate students; practice procedures; organization

INVASION OF PRIVACY: ANALYSES OF MUSIC PRACTICE BY ARTIST-TEACHERS AND THEIR STUDENTS

Robert A. Duke^{1*}, Sarah E. Allen², Carla D. Cash³, and Amy L. Simmons¹

¹ Center for Music Learning, Sarah and Ernest Butler School of Music, University of Texas at Austin, USA

² Meadows School of the Arts, Southern Methodist University, USA

³ School of Music, Texas Tech University, USA

* Correspondence: bobduke@austin.utexas.edu

Background

The extent to which practice and genetic predisposition each contribute to music performance skill is a topic of continuing debate. Various investigations have suggested that music *ability* is in large measure heritable, and recent twin studies have revealed relationships between genetic factors and music practice behavior. Development of the notion of deliberate practice helped clarify the fact that all practice is not equal, that time spent in practice is beneficial only to the extent that learners generate specific performance goals, carefully monitor performance, and strive to increase their levels of competence. Results of a recent meta-analysis support the assertion that deliberate practice is an important feature of musical accomplishment.

Aims

This research extended our previous investigations of music practice by skilled performers, in this case by comparing the practice behavior of artist-teachers with the practice behavior of their own students. We will summarize our previous work and discuss (1) the deployment of practice strategies by artist-teachers and student musicians in relation to proximal performance goals and (2) participants' verbal descriptions of the general principles of practice and of approaches to overcoming specific performance challenges.

Method

We recorded uninterrupted practice sessions of six artist-teachers and 12 students enrolled in their studios. In each recording we identified intervals of practice time devoted to proximal goals and documented the approach to accomplishing each, analyzing all recordings using Scribe behavior analysis software, and creating narrative analyses.

Results

Our analyses of artist-teachers' practice revealed an important feature of their approach that has been the focus of few investigations, namely, their allegiance to maintaining all relevant aspects of performance as they worked to form and refine procedural memories. Rather than devoting attention to separate aspects of performance (e.g. intonation, timing, and, importantly, expressive inflection) in a given performance trial, artist-level participants' individual repetitions were performed in ways that included all relevant aspects of the repeated passages; that is, with attention devoted to all elements of effective music making. Analysis of their less-experienced students' recordings revealed a different approach, in which repetitions frequently failed to include all aspects of performance and, often, were performed with a lower quality than the performance trials of experts.

Conclusions

We organized our descriptions of results in terms of *overall practice session structure*, *goal setting*, *strategic repetitions*, and *maintenance of all elements of performance in each repetition*. Regardless of the relative contributions of genes and experience to the development of music performance skills, effective practice is a sine qua non of musical accomplishment. It seems clear that artist-level performers practice in ways that can be described more effectively for aspiring musicians. Our results, and the accompanying illustrative video recordings, are intended to further that goal.

Keywords

practice; skill learning; memory; music; error correction

Acknowledgments

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Thematic session

Insights from dance I

UNDERSTANDING THE ROLE OF SOCIAL SUPPORT IN THE TALENT DEVELOPMENT OF BALLET STUDENTS IN FINLAND AND SINGAPORE

Joey Chua^{1*}

¹ Department of Teacher Education, University of Helsinki, Finland

* Correspondence: poh.chua@helsinki.fi

Background

Research about how students thrive on social support is crucial. It provides insights for counsellors, educators, and parents into how students can capitalize on positive relationships with significant individuals to excel. Research findings across a range of domains such as music, art, and sports have been consistent: to realize potential talent, the talented individual requires certain types of support from family and teachers at each phase of development. Yet, little is known about how exceptionally talented dance students develop through the three phases: early, middle (i.e. more advanced and intensive lessons), and later years of learning (i.e. pre-professional).

Aims

The present study aimed to clarify how well significant individuals have supported the exceptionally talented dance students across the different stages of their talent development. The other aim was to compare and contrast the cross-national findings in terms of the types and sources of social support provided by the significant people.

Method

The perspectives of students (n=4), parents (n=2), teachers (n=6), and a sibling were analyzed. The four *exceptionally talented* students, aged 16-22, were enrolled in their national dance institutions (the Finnish National Opera Ballet School and the Singapore Dance Theatre). Data were documents, letters, interviews, and observation field notes. Bloom's model of talent development prescribes a useful conceptual framework for the present study to analyse the data from a developmental, age-related perspective.

Results

Common themes that emerged from this prospective, two-year study were "being there," "sharing," and "knowing" that illustrated the types of support—instrumental, emotional, and informational—from families, peers, and teachers that contributed to the students' development. In summary, there was a consistency of support from family and teachers across the four cases, and support from peers across the Finnish cases. The significance of support type, first, was different across gender. The girls, more than the men in the present study, sought emotional support from adults. Second, instrumental support from parents was critical, although in varying importance, for all students during all phases. Third, informational support was essential from teachers across all cases during all phases (except for one male dance student), from peers across the Finnish sample during the third phase, but less from parents. The findings include reflections about mindset, self-efficacy, and pedagogical practices, and also suggest a difference between the third-phase teachers in Finland and Singapore in terms of addressing the students' developmental needs in becoming professional dancers.

Conclusions

A conclusion offers important educational implications for teachers: they should (1) counsel and empathize with students who are injured; (2) strive to use psychological skills to effectively reassure and restore self-confidence of young students who progress to a more advanced class; (3) hold a growth mindset to impress upon students that sustained effort, in addition to changeable dance abilities, are crucial in dance talent development; (4) praise students with immediate, explicit feedback; and (5) facilitate reflection, especially during the second and third phase, so that students are not overly reliant on teachers' feedback and focus only on weaknesses.

Keywords

social support; dance talent development; ballet dancers and teachers; dance education in Finland and Singapore; Bloom's model of talent development

DANCING TOGETHER AT THE SAME TIME: SYNCHRONIZATION PRINCIPLES IN HUMAN MOTOR CONTROL

Derrick D. Brown^{1,2} and Ruud Meulenbroek¹*

¹ Donders Institute for Brain Cognition and Behaviour, Radboud University, The Netherlands

² Dance Academy, ArtEZ Institute of the Arts, The Netherlands

* Correspondence: d.brown@donders.ru.nl

Background

Simultaneous dance requires delicate coordination of postural changes in interpersonal space. Only few motor control studies have focused on this topic; more have looked at tapping behaviour of individuals trying to sync with the beats of a metronome. Until research properly expands to dance, motor control theories may provide powerful insights into principles, mechanisms, and constraints in the timing of joint action that have practical implications for dance training.

Aims

We will first define synchronization in shared task performance and highlight some expert achievements in moving into sync with music, and with each other, in various dance forms. Secondly, we will briefly highlight the neural structures and mechanisms that have been shown to be key in joint timing. Finally, for each subtopic the relationship with dance training will be tentatively formulated, substantiated with empirical data obtained in an experiment involving seven student pairs who were asked to dance synchronously under various training conditions.

Main contribution

Subsequently, we will focus on important insights into timing of behavior to external cues from three different motor control theories. In particular, we will elaborate on information processing theory, dynamical systems theory, and ecological psychology with particular emphasis on: the unicity problem, the degrees of freedom problem, action monitoring, sensorimotor delays, speed-accuracy trade-off, preferred amplitudes and frequencies, intrinsic dynamics, frequency coupling, and visual flow. For each subtopic the relationship with dance training will be tentatively formulated.

Implications

Insights into motor control theories and their relation to both cognitive and neural correlates will augment the current knowledge base in pedagogy, dance education, and the application of dance science principles to health care in this population.

Keywords

dance; synchronization; joint-action; motor control; experimental psychology

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DANCER AEROBIC FITNESS ACROSS TEN YEARS

Emma Redding^{1}, Imogen Aujla², Sarah Beck¹, Stephanie De'Ath¹, Sanna Nordin-Bates³, Edel Quin¹, and Sonia Rafferty¹*

¹ Dance Science, Trinity Laban Conservatoire of Music and Dance, UK

² University of Bedfordshire, UK

³ Swedish School of Sport and Health Sciences, Sweden

* Correspondence: e.redding@trinitylaban.ac.uk

Background

There is general agreement that dancers would benefit from supplementary fitness training, primarily due to the discrepancy between the intensity of training and performance. However, the debate about fitness requirements is on-going. Alongside this, attempts have been made to create dance-specific physiological tests in order to offer a mode of assessment to dancers, which is familiar and relevant to them. The Dance Aerobic Fitness Test (DAFT) was the first of its kind to assess dancers' aerobic capacity outside of the laboratory using contemporary dance movement

vocabulary. First validated and published in 2003, the DAFT has since been used by numerous dance companies and schools in 17 different countries including Australia, the United States, and China as a fitness-screening tool.

Aims

This aim of this study was to assess change in dancers' aerobic fitness using the Dance Aerobic Fitness Test. A secondary aim was to gather the largest ever data sample of dancers' aerobic fitness spanning some 10 years.

Method

Every year from 2004 to 2015, full-time vocational dance students at a leading contemporary dance conservatoire participated in the incremental five-stage, 20-minute dance aerobic fitness test. Pre-vocational dance students studying on a government-funded talented scheme also participated in the test across three years. New student cohorts were assessed at the beginning of their training to determine their start-of-year aerobic fitness levels and once again during their training. Heart rate (HR b/min) was measured at the end of each of the five stages. Statistical analyses were performed to determine change in the sample's aerobic fitness expressed as % of their age predicted HRmax.

Results

Improvements in aerobic fitness were seen in several cohorts with greater improvements noted among those who did additional supplementary fitness.

Conclusions

The dancers who engaged with supplemental fitness training appeared to improve their aerobic fitness capacities as determined through a dance specific fitness test. Importantly, this baseline dancer fitness data will provide the largest ever bank of normative values of dancer aerobic fitness.

Keywords

dance; fitness; specificity; testing; physiology

Keynote paper

SPEAKING TO THE NEUROMOTOR SYSTEM: LEARNING AND REFINING VOLUNTARY MOVEMENT

Janet Karin^{1,2}*

¹ Australian Ballet School, Australia

² Australian Catholic University, Australia

* Correspondence: janet.karin1@gmail.com

Background

Ballet has traditionally been taught through physical demonstration of the shapes to be created and verbal instruction of the main action required. In recent decades, many ballet teachers have used their knowledge of anatomy to instruct dancers in the major muscle actions involved in each movement. While the success of many dancers indicates the effectiveness of this method, the author suggests that dancers and their teachers benefit by utilizing the brain's own system for producing efficient, harmonious, and expressive movement.

Aims

The author discusses the way the neuromotor system produces voluntary movement in order to consider the relevance of various cueing systems in learning movement skills specific to athletics, music, and dance. Somatic awareness and imagery are proposed as foundation elements of learning skilled movement. A case study explores the role of entrenched motor patterns, naïve beliefs, protective responses, and unrealistic expectations of the human body's capability in chronic injury.

Main contribution

Neuroscience is developing rapidly, leading to a growing understanding of the mechanisms underlying voluntary movement. However, the role of somatic awareness and imagery as the brain's natural cues in teaching and learning

skilled movement is still not completely understood. The presentation explores the application of a new theory concerning the different ways the motor system processes different types of cues. The author links findings from cognitive neuroscience, psychology, functional anatomy, and educational theory with problems that arise as young people strive to overcome real and perceived physical limitations in order to achieve success. A case study of an adolescent dancer with a recurrent spinal stress fracture demonstrates a range of preventative and rehabilitative techniques, and discusses the gradual uncovering of cognitive, psychological, and physical blocks that had prevented earlier recovery.

Implications

In working for many years with elite adolescent dancers in full-time training, and occasionally with mature professional dancers, the author has found that the theories and practices explored in the presentation can overcome technical weaknesses, improve performance, and assist in preventing injury. Possibly more importantly, they enable injured dancers to investigate the psychological and physical bases of their movement and to choose to make changes that allow them to progress beyond their pre-injury level, even before they return to full activity. By restoring natural motor processes, the dancer gains efficiency, skill, balance, grace, expressivity, and pleasure in movement. The author offers these findings in the hope that they may be useful in other fields of physical endeavour.

Keywords

dance; neuromotor; somatic; imagery; beliefs

Thematic session Practicing for performance II

PRACTICE QUANTITY, PRACTICE QUALITY, MOTIVATION, AND THEIR ROLES IN IMPROVING PERFORMANCE

Paul Evans^{1} and Gary E. McPherson²*

¹ School of Education, University of New South Wales, Australia

² Melbourne Conservatorium of Music, University of Melbourne, Australia

* Correspondence: paul.evans@unsw.edu.au

Background

For musicians in the highest levels of training in music conservatories, practice is one of the key activities for developing performance ability. Research has shown that: (1) accumulation of many hours of deliberate practice explains a considerable amount of variance in expert performance; (2) the quality of that practice is an important consideration, and that mechanical, mindless practice is less effective than strategic, goal-directed practice; and (3) sustaining practice quality and quantity requires an immense amount of motivational resources.

Aims

This paper aims to advance an empirically verifiable model integrating motivation, practice quantity, and practice quality.

Main contribution

Motivation, practice quantity, and practice quality have been shown to impact performance, but rarely has the interaction of these aspects of learning been examined.

Our conceptual approach to the model draws from three research traditions. *Practice quantity* draws from Ericsson *et al.*'s deliberate practice framework for studying expertise. This framework contends that expert performance can largely be explained by the accumulation of 10,000 hours of effortful, structured practice. *Practice quality* is operationalized as self-regulated learning, which explains performance differences by the degree to which learners set goals for their learning, believe in their ability, monitor their progress, regulate their strategies, and reflect on their learning. *Motivation* is examined through the lens of self-determination theory, an approach that understands human motivation through how people's transactions with their social environments fulfill basic psychological needs, enabling effective learning and wellbeing.

These three features of performance are undoubtedly related, but we do not yet know how and how much. For example, the effortful, strategic, goal-directed aspects of deliberate practice defined as *deliberate* practice share conceptual overlap with practice quality, operationalized here as self-regulated learning. To date, no study has precisely examined the two variables of practice quantity and practice quality, yet conflating them has been a problem in contemporary debates on deliberate practice and expertise.

Implications

These issues must be studied together in order to understand whether there are any causal relations between them. For example, does effective motivation directly improve performance? Or, conversely, does motivation come from increased performance gains—the feeling of getting better and better? A conceptual model could help researchers to resolve these chicken-and-egg issues and begin to understand how and where to intervene in order to improve student performance and wellbeing outcomes.

For practitioners, conservatories, and university music departments, the empirical results would be of immense value in understanding where and how to intervene in order to improve performance—in improving motivation, practice quality, or practice quantity, or some balance of the three. Knowing where to intervene is important because considerable resources are potentially wasted by intervening in areas that will not result in performance improvements and could indeed threaten the wellbeing of students.

Keywords

self-determination theory; self-regulated learning; deliberate practice; motivation; intervention

Acknowledgments

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THE TEACHING AND LEARNING OF SELF-REGULATED PRACTICE BEHAVIOR: TWO CASE STUDIES OF STUDIO LESSONS IN JAZZ/IMPROVISED MUSIC

Siw G. Nielsen^{1*}

¹ Department for Music Education and Music Therapy, Norwegian Academy of Music, Norway

* Correspondence: siw.g.nielsen@nmh.no

Background

This paper reports on a research project that focused on the teaching and learning of self-regulated practice behavior in studio lessons within the context of a Nordic music conservatoire. Based on a master-apprenticeship tradition, instrumental teaching in higher education music institutions typically involves one-to-one lessons provided to a student by a teacher. This form of individual teaching provides both the student and his or her teacher the opportunity to discuss progress, to plan activities that will enhance performance, and to devise strategies to cope with various technical and musical challenges. Hence, there is space in the studio lesson to support and develop the student's self-regulated practice behavior outside the studio. There is relatively little empirical research on the teaching of such practice activities in lesson meetings.

Aims

From theory on the self-regulation of musical learning from a social-cognitive perspective, we know that self-regulated learning involves skills to maintain concentration and develop self-motivation to persist in musical learning, to adapt suitable learning strategies that will facilitate instrumental learning, to plan and manage the time available for practicing, and to modify and react to feedback while learning. A model of self-regulation in developing performance skills describes six different dimensions of musical self-regulation and the socialization processes that facilitate their development. The present study explored two of these dimensions: the processes of self-set goals and self-initiated strategies and their socialization processes in the context of studio lessons in jazz/improvised music.

Method

Two experienced teachers in jazz/improvised music and two of their four-year performance degree programme students were video recorded in one-to-one tuition situations. Both the students' and the teachers' verbal activities during the studio lessons were transcribed verbatim from the videotapes. All verbal activities from each studio lesson were listed in subsequent order in a schema that also included four overall categories on the participants' distinct musical activities, in addition to reference to specific measures or sections of the music played when referred to in the verbal activities. After this first phase of analysis, a detailed coding and categorization of all activities was con-

ducted, and finally, theoretical categories from theory on self-regulated learning were deducted on the categorized activities in order to display various forms of performance goals and task strategies.

Results

A key issue to be discussed is how the instrumental teachers in the studio lessons helped the students to formulate performance goals and initiated strategies for executing and regulating practice, and as such helped to facilitate the students' self-regulated learning processes.

Conclusions

Educational implications will be discussed.

Keywords

the teaching of practicing; practice behaviour; studio lessons; self-regulated learning; higher music education

UNDERSTANDING THE CREATIVE PROCESS IN THE SHAPING OF AN INTERPRETATION BY NINE MUSICIANS

Isabelle Héroux^{1} and Marie-Soleil Fortier¹*

¹ Department of Music, Quebec University in Montreal, Canada

* Correspondence: heroux.isabelle@uqam.ca

Background

Research of expert musicians helped define what constitutes effective rehearsals, identified the elements constituting expression and its role, and described the preparatory steps of a piece of music by identifying learning (rather than creative) strategies and processes. If creativity underlying the interpretation of a musical work has nevertheless been studied, it is in the manner of a “creative product.” Indeed, the authors have been primarily interested in creativity in the form of musical performances or recordings. Little research has been done to uncover the creative process in situ, underlying the interpretation of a piece of music by professional musicians. However, a case study by Héroux and Fortier uncovered aspects of creative work that do not appear in the literature. Furthermore, these authors have identified a stage of artistic appropriation consisting of different cognitive processes. Research on the stage of artistic appropriation is based on the feeling of accuracy in the expressivity of the interpretation (dynamics, sound, phrasing, etc.) used by the subject to validate the quality and authenticity of the interpretation.

Aims

The aim of this research was to investigate how 9 professional musicians work on a same, never-before heard, piece of music. Through this study, we aimed to uncover the creative process underlying the interpretation of a piece of music by professional musicians “in situ.”

Method

Data collection was conducted by videotaping rehearsals with verbalization, combined with a reflexive questionnaire and the description of the musicians' actions by a third-party observer. Then, the data were first analyzed through a content analysis with NVivo 8. In a second step, interview techniques borrowed from phenomenology were used, i.e. self-confrontation interviews and explicitation interviews which enabled the verbalization of the action *a posteriori*. Grounded theory analysis was used to analyze the data from a phenomenological point of view.

Results

Results are congruent with the existing literature about creative process, e.g. alternation between divergent and convergent thinking, creative associations, and artistic appropriation. While we observed various strategies used by expert musicians to create an original interpretation, we also identified common creative processes that allow us to realize a representative model.

Conclusions

This research contributes to furthering knowledge of performance practice studies, research in creativity, and music pedagogy. Indeed, we hope that a better understanding of the creative process underlying the work of performers will lead to new grounds for the teaching of musical interpretation.

Keywords

creativity; interpretation; methodology; phenomenology; performance

Thematic session

Insights from dance II

KINEMATIC CHARACTERISTICS OF JAPANESE TRADITIONAL DANCE: FROM CULTURAL SIGNIFICANCE

Mayumi Kuno-Mizumura^{1*}, Hideyuki Ishii², Hiroki Ozaki³, Jun Umezawa¹, Yayoi Izaki¹, and Yasuyuki Yoshida⁴

¹ Faculty of Letters and Education, Ochanomizu University, Japan

² Department of Sport and Wellness, Rikkyo University, Japan

³ Singapore Sports Institute, Singapore

⁴ Department of Human System Science, Tokyo Institute of Technology, Japan

* Correspondence: mizumura.mayumi@ocha.ac.jp

Background

Dance is a genre of performing arts but also non-verbal communicative bodily expression. A previous study had reported that a gender difference in movement characteristics, especially in bodily symmetry, and concluded that dance in Jamaica seemed to show evidence of sexual selection and to reveal important information about the dancer. Japanese traditional dance is unique in that both male and female dancers act as both genders, where male dancers act both female and male depending on the role. Even during walking on the stage, they might move differently according to their gender roles on the stage. Even during daily practice, they perform every movement as a female or a male. However, no previous study has examined the effect of gender expression on movement characteristics of Japanese traditional dancers.

Aims

The aim of this study was to investigate the differences in kinematic characteristics of basic movements, including gait, performed by elite Japanese traditional dancers acting in different gender roles.

Main contribution

Subjects were four female and four male professional Japanese traditional dancers called “Natori,” which means *certified professional dancers*. They were asked to walk in to Japanese traditional dancing styles in two ways; one as a male and the other as a female. Eight video cameras captured movement images at 120Hz and three-dimensional motion analysis was applied by special software (SIMM, NAC, Japan). To compare different gender expressions, kinematic variables of lower limbs were analyzed.

Implications

This study contributes to research evaluating cultural characteristics of Japanese traditional dance, which is one of the major performing arts in Japan. Dance is believed to be one of non-verbal communication so it might contain cultural characteristics in itself.

This study seeks to understand bodily culture contained in Japanese traditional dance movement not only for Japanese artists but also for all dancers as well as all audiences.

Keywords

Japanese traditional dance; gait; gender expression; motion analysis

CHARACTERISTIC FEATURES OF JAPANESE BALLET EDUCATION: A NATIONAL SURVEY AND COMPARISON WITH THE UK

Kumi Oyama^{1*}, Bin Umino², and Rui Ozaki³

¹ Faculty of Music, Showa University of Music, Japan

² Faculty of Sociology, Toyo University, Japan

³ Ballet Research Centre, Showa University of Music, Japan

* Correspondence: kumi.oyama@tosei-showa-music.ac.jp

Background

There are numerous private ballet schools which play a significant role in Japanese ballet education. However, there has been little research conducted on this topic, and even basic figures (such as the total number of ballet schools in Japan or an estimated number of ballet learners) have not been investigated in the past.

Aims

The aim of this research was to gain a better understanding of Japanese ballet education by conducting a questionnaire survey among ballet schools in Japan and interviewing key persons in the UK dance industry.

Method

Two survey methods were employed. First, a nation-wide questionnaire survey on all ballet schools in Japan was conducted. 4,630 questionnaires were sent and 1,469 valid replies were received. Second, an interview survey with key persons in the UK dance industry was conducted.

Results

The results of the questionnaire survey showed that approximately 400,000 people practiced ballet and there were approximately 20,000 ballet teachers in Japan. 14% of the valid responders indicated that they have teachers with ballet teaching qualifications in their schools. Whereas the results of the interview survey show that: (1) Japanese ballet education heavily relies on these private schools due to the lack of centralized educational system compared to the system in the UK; (2) the boundaries between amateurs and ballet students aspiring to be professional in the future in Japan were more ambiguous than in the UK; and (3) there are fewer qualified teachers in Japan than in the UK.

Conclusions

The surveys revealed several characteristic features of Japanese ballet education, such as large number of learners and private ballet schools, high dependence on individual effort, ambiguity of boundaries between amateurs and ballet students aspiring to be professional, and a lack of qualified teachers.

Keywords

ballet education; questionnaire survey; interview survey; Japan; UK

QUESTIONING EFFICIENCY IN DANCE: A CONFLUENCE OF SCIENCE AND SOMATICS?

*Edel Quin¹**

¹ Dance Science, Trinity Laban Conservatoire of Music and Dance, UK

* Correspondence: e.quin@trinitylaban.ac.uk

Background

To be an “efficient” dancer is arguably to perform the desired movement utilizing only the required degree of physical and mental effort: no more and no less. The study of efficient human movement is complex and occurs at a point of confluence between body and mind, and between scientific and somatic theories.

Aims

The purpose of this presentation is to provide a review of the scientific and somatic literature surrounding efficiency in human movement, and more specifically in dance. Questions will be raised about the meaning and relevancy of the term for dance research and application.

Main contribution

From a mechanical perspective, efficient movement is said to require balanced muscle activation and the use of minimum force production for the desired effect, both of which are supported by an “efficient” skeletal alignment. Biomechanical research studies have utilized electromyography (EMG) and kinematic analysis to investigate such theories. Research into physiological efficiency has explored energy demands of specific activities by measuring maximal oxygen uptake. Recent research has also demonstrated the effects of positive psychology on increased efficiency in runners and research into attentional focus has proposed that an external focus results in increased efficiency in multiple sporting activities. Somatic principles and practices promote efficient movement patterning through an integrated body-mind perspective, where practices such as Feldenkrais work on deconstructing inefficient habitual movement patterns in order to explore and then reinforce more effective movement patterns.

How then, does the research from across various domains relate to optimizing dance performance? Can a dancer maintain, or indeed increase, their artistic virtuosity while also being efficient? Should we be working towards promoting maximum efficiency in our dancers? And if so, how can we best train dancers for this?

Implications

This presentation will draw attention to alternative meanings and interpretations of the term efficiency within dance science and somatics research and application. In doing so, approaches to dance training will be examined in relation to best practice.

Keywords

efficiency; science; somatics; dance performance; training

Poster session I

BEHAVIORAL CHANGES IN PROFESSIONAL PIANISTS DURING A SHORT PERIOD OF PRACTICE FOR A NEW PIECE

Eriko Aiba^{1} and Toshie Matsui²*

¹ Graduate School of Information Systems, University of Electro-Communications, Japan

² Faculty of Systems Engineering, Wakayama University, Japan

* Correspondence: aiba.eriko@uec.ac.jp

Background

Professional musicians must often complete practicing a new piece of music in a very short period of time (e.g. playing the whole piece only a few times). Musicians are required to use highly advanced techniques to do multiple tasks simultaneously; that is, they must read a musical score, control their fingers, and interpret the music all at the same time. However, it is unclear which task should take priority, and at which stage of practice.

Aims

The aim of this study was to investigate the strategies used by professional pianists to quickly complete practicing a new piece of music.

Method

The behavior of professional pianists was observed from the start of practicing a new piece of music to the task's completion, paying particular attention to any behavioral changes. Participants (two professional pianists) practiced a new piece of music (*Mazurka* from *Escenas Romanticas* by Granados) on a hybrid piano (Yamaha, AvantGrand N2) in a soundproof room. We monitored the pianists' eye direction in order to observe how the musicians divided their attention between the music score and the piano keys while playing. To avoid disturbing their body movement and concentration, eye direction was estimated from the recorded video via image processing. The sound signal was recorded from the hybrid piano in WAV format (16 bit, 48 kHz sampling rate) and MIDI. First, the pianists were required to play the music by sight-reading. Then they practiced the piece as usual for about 20 minutes. After that, they performed the whole piece with the music score.

Results

In the first performance (sight-reading), the pianists kept their eyes fixed on the music score most of the time. Even as they approached a part of the piece that required a hand to leap they preferred to read the music score and did not look in the direction of the keys. In the final performance, however, after a short practice period, the pianists increased the time and duration that they looked at the keys. In particular, one of the pianists, who was good at learning a new piece of music aurally, looked in the direction of the keys most of the time. In terms of musicality, in the first performance, the velocity of each note was almost constant. However, in the final performance, the velocity varied widely. The pianists' body movement also increased in the final performance.

Conclusions

Professional musicians might change the priority they assign to different musical tasks in a short period. It is possible that the allocation of each task differs depending on the way a musician learns a new piece of music.

Keywords

behavioral change; professional pianist; practice of a new piece; eye movement; multiple tasks

Acknowledgments

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THE MULTIMEDIA COMPOSITION *EL SUEÑO ... EL VUELO*: ITS LAYERS OF SIGNIFICATION AND PERFORMANCE

Silvia Maria Pires Cabrera Berg^{1*} and Ana Cervantes²

¹ Music Department, University of São Paulo, Brazil

² Yamaha Artist, Independent Concert Pianist and Teacher, Mexico

* Correspondence: silviaberg@usp.br

Background

El sueño ... el vuelo (The Dream ... the Flight), a solo piano piece composed by Silvia Berg, was commissioned in 2009 by pianist Ana Cervantes as part of her international project *Canto de la Monarca: Mujeres en México*. Cervantes performed the world première in the Festival Cervantino in Mexico in October of 2010, and has since recorded the piece and played it in more than 20 concerts in the USA, Brazil, Cuba, and Mexico.

This piano piece was inspired by the painting *La columna rota* (The Broken Spine), by Frida Kahlo and on her famous house, named *La Casa Azul* (The Blue House) in Coyoacán, Mexico, where she created most of her work and where she lived with her husband, the artist Diego Rivera. The melodic and harmonic discourses, in constant transformation, recall some compositional processes of Robert Schumann (1810-1856) and the constructions of melodic expansions are re-readings of melodic constructions used by Hildegard von Bingen (1098-1179).

Aims

Through a multimedia analysis of *El sueño ... el vuelo*, we propose to flesh out a model for analyzing multimedia musical works, be they art-song, choral pieces, or instrumental works, thereby expanding the original model proposed by Nicholas Cook for TV advertisements in the Introduction of his book “Analysing Musical Multimedia.” Cook examined the intersection between two or more forms of Art in a single work, the ways in which these mutually reinforce—or contradict—each other and how the media interrelate in a single work with the goal of creating diverse meanings beyond those each medium could create for itself. Those intersections were debated, discussed, and analyzed.

Main contribution

According Cook, “media such as music, texts, and moving pictures do not just communicate meaning, but participate actively in its construction.”

Analysis through multimedia tools is a recent development. By using these in a specific analysis we seek to enlarge a model that can be used in analyses, in order to help expand the understanding of the complexity of such works, thus extending the process of interpretation, performance, and performance education.

Implications

The unfolding of the multimedia analysis model has proven useful in building performances, in performance education, and providing a doorway into new compositions for the audience.

Keywords

El sueño ... el vuelo; piano solo; Frida Kahlo; multimedia analysis; performance

Acknowledgments

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THE PROGRAM NOTE: INFORMATION FOR PERFORMER AND AUDIENCE?

Diana Blom^{1}, Dawn Bennett², and Eddy Kwong Mei Chong³*

¹ Music, University of Western Sydney, Australia

² Research and Graduate Studies, Curtin University, Australia

³ National Institute of Education, Nanyang Technological University, Singapore

* Correspondence: d.blom@uws.edu.au

Background

Little is written about how program note information impacts the listening experience of audiences and whether the information is useful to performers. In classical music concerts the provision of a program note is a widespread practice, dating back to the mid-1800s, which informs listeners and performers about historical context, composer details, and compositional thinking. However, program notes have been found to not necessarily aid listener enjoyment. For canonic works performers and audiences may already know much of the program note information, but this is less likely for newly composed works. Contemporary scores often contain performance notes for the performer and it has been suggested that listeners new to contemporary music might benefit from short descriptive notes.

Aims

This project sought composers' views on the role of program notes for performers and listeners, and whether different information should be given to each.

Method

Fourteen composers responded to a questionnaire. All had written works for one of two projects: Antarctica – new music for piano and/or toy piano; or Australia East and West – new music for viola and piano. Responses were coded in relation to the performer and the audience, but further analysis noted other emerging themes.

Results

The composers wrote generic program notes that promoted understanding of the work and established communication between composer, performer, and audience. Composers included poetic and aesthetic information to engage listeners, and they noted that different music requires different approaches and information.

Asked whether program notes should differ for performers and listeners, five composers responded that they should be the same. Two noted that, in some cases, such as with novel notation, performers' notes should be more instructive than those for the listener. Seven composers felt that performers should receive technical and compositional information while listeners should receive narrative information "to create a receptive disposition towards listening" while "leaving some mystery in the air." This information balance was described as "different layers of analysis" which enabled listeners "to listen in a better way to a new piece" and equip performers with necessary technical and instructional information.

Conclusions

While several composers were happy with one program note for both listener and performer, most felt the need for two: for listeners, "program" notes that encourage informed but open listening; and for performers, "performance notes" containing technical information that informs interpretation and understanding. Both forms often exist within a score, and yet the literature's finding that program notes might lessen listeners' enjoyment of music raises questions about their impact and value. Further research could explore the impact of program notes in terms of content, language, mode of delivery, and listener experience.

Keywords

program-note; contemporary classical music; performance-notes; composer

A COMPARISON OF EXPERT AND NOVICE ERROR CORRECTION TASK PERSISTENCE WITHIN INSTRUMENTAL MUSIC REHEARSALS

Mary Ellen Cavitt¹*

¹ School of Music, Texas State University, USA

* Correspondence: m.e.cavitt@txstate.edu

Background

A major goal of teaching instrumental music is to effect positive change and refine the quality of student performance within music rehearsals. Most research has studied task persistence and perseverance from the student perspective rather than from that of the teacher. Gibson and Dembo examined teacher efficacy and defined teacher persistence as “the ratio of feedback interactions in which a teacher either repeated the question, provided a clue, or asked a new question following a student’s incorrect response.” Wheatley in *Essays in Education* stated that teacher persistence “may promote high expectations for students, the development of teaching skills, teachers’ reflectiveness, responsiveness to diversity, teaching efficacy, effective responses to setbacks, and successful use of reformed teaching methods” but that teacher education evaluation practices may undermine teacher persistence.

In David Hebert’s ethnographic study of Japanese band culture and performance, he stated that the objectives for band rehearsals were not exclusively to achieve “musical excellence with maximum efficiency.” Instead, Japanese students were encouraged to struggle for long hours, build endurance, and instill self-discipline. It was the teacher’s job to teach students to persevere at difficult tasks in order that they became successful adults who knew how to endure hardships.

Aims

The purpose of this study was to examine teachers’ error correction task persistence using the “rehearsal frame” as a unit of analysis to elucidate positive change in rehearsals. Task persistence was described in terms of: (1) performance trials within rehearsal frames, and (2) feedback statements made while attempting to correct errors within rehearsal frames.

Method

20 video examples of 10 expert instrumental teachers’ rehearsals and 10 student teachers (all of whom had previously been recorded) were analyzed to demonstrate how persistence, repetition, and remediation function within concert band rehearsal frames. After I noted the beginning and ending times using a video recorder and identified the targets for each rehearsal frame, I returned to each frame to record the teacher and student behaviors selected for study using a computerized observation program, SCRIBE (Simple Computer Recording Interface for Behavioral Evaluation).

Results

Very little research has focused on how teachers persist during the error correction process. The perceived outcome of each rehearsal frame was compared with how successful the teacher was at effecting change in the targeted goal (and the relationship of persistence and progress towards a goal). Persistence within various rehearsal frames focusing on different error types was analyzed.

Conclusions

Persistence was measured by frequency and rate per minute of performance trials and teacher feedback statements within the context of each rehearsal frame. Performance trials were divided into full ensemble, section, and individual categories and teacher feedback statements were analyzed. The ratio of corrective to positive feedback was compared with previous error correction research.

Keywords

error; correction; task; persistence; music

ASSESSING THE ARTISTIC IDEALS IN MUSIC PERFORMANCE: AN EXPLORATORY STUDY

Gilvano Dalagna^{1}, Filipa M. B. Lã¹, José M. Fernandes², Susana Brás², and Graham Welch³*

¹ Department of Communication and Art – INET/MD, University of Aveiro, Portugal

² IEETA, University of Aveiro, Portugal

³ Department of Culture, Communication, and Media, Institute of Education, University College London, UK

* Correspondence: gilvano.d@gmail.com

Background

Several authors have suggested that artistic ideals play an important role in music performance optimization. Moreover, it has been suggested that an optimized performance is likely to correspond to the one in which the musicians' expectations of their ability to communicate artistic ideals are fulfilled. However, there is still a lack of knowledge on how musicians process their artistic ideals, particularly during higher education. Students in higher education have been reporting a lack of encouragement in exploring their own artistic ideals. This feature constrains a smooth transition from student to professional. Thus, it seems rather important to develop a conscious understanding of student's artistic ideals and of how these might be professionally realized.

Aims

This paper aimed at investigating the processes involved in student's development and achievement of an artistic ideal, applying both qualitative and quantitative research methods.

Method

A postgraduate pianist attended a nine-week artistic music performance mentoring program, aiming at preparing a piano performance based on the development of the student's own artistic ideal. Three data sets were collected previous to, during, and after the performance: (1) to conceptualize the student's artistic ideals, semi-structured interviews were carried out during the course of the artistic music performance mentoring program; (2) to assess psychophysiological events that may be related to the accomplishment of student's artistic ideals, heart rate variation (HVR) was collected during the performance; and (3) a debriefing session based on self-reflections of the video of the performance took place, to assess whether the student's artistic ideals were achieved during the actual performance.

Results

The results of the interviews suggested that this particular student revealed difficulties in coordinating a coherent set of beliefs concerning pursued artistic ideals. The psychophysiological markers depicted high levels of maladaptive anxiety while performing, supporting the assumption that the artistic ideals of this student were not in tune with her artistic choices. This hypothesis was corroborated when discussing self-perceptions of performance achievements. The results brought to the light a concern towards achieving a certain technical-interpretative level, as well as the need for being recognized as a classical performer. Good experiences during the performance were reported only when participating in joint performances involving scenic representations.

Conclusions

This study reinforces the need for constructive approaches in learning music performance during higher education. Particularly, it seems to be necessary to mentor the students in the art of becoming authentic to their own expressive and musical beliefs.

Keywords

artistic ideals; music performance; higher education; mentoring; expressive authenticity; self-authorship

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THE MAKING OF A COMPUTERIZED HARPSICHORD FOR ANALYSIS AND TRAINING

Ichiro Fujinaga^{1}, Gabriel Vigliensoni¹, and Hank Knox¹*

¹ Schulich School of Music, McGill University, Canada

* Correspondence: ich@music.mcgill.ca

Background

Research on the performance of keyboard music has been largely restricted to the piano; harpsichord performance has been virtually unexplored. The harpsichord presents many challenges for a performer. Unlike the piano, changing the force applied to a harpsichord key makes little or no difference to the volume of the resulting sound which is generated by plucking the corresponding string with a plectrum. Thus, control over the volume of notes produced is limited. The player, however, has precise control over the timing between note attacks and the spaces between notes, and skilled harpsichordists are able to produce lively and moving performances. To study of harpsichord performance in depth, we have built a computerized acoustic harpsichord capable of recording and playing back keystrokes and playing a MIDI input stream.

Aims

The main use of our computerized harpsichord is to explore and analyze the minute differences in playing style that characterize expressive performance, and to explore strategies in the realization of basso-continuo accompaniment. This is intended to study the practice of expert players and to help train future harpsichordists.

Method

Our one-manual harpsichord, built by a world-renowned harpsichord builder, is modeled after a 1704 two-manual instrument by Nicolas Dumont. It has been modified slightly to fit the electronics, which include sixty-one hall-effect sensors, one for each key, along with sixty-one electro-magnets to activate each key. These electro-magnets were developed specifically for the purpose of activating musical keyboards. The data from the sensors and to the playback system go through an USB interface.

In addition to the software for recording and playback of recorded keystrokes, we modified the music21 software for basso-continuo realization and built a score-following system based on Antescofo, in order to accompany a soloist in real time.

Results

A premiere live concert performance of Arcangelo Corelli's Op. 5, No. 3 took place on May 24, 2015 as part of the International Conference of the Historical Keyboard Society of North America.

Conclusions

Several implications are evident with our system: First, by having both expert and student harpsichords play on the instrument, we will be able to identify and analyze different strategies that characterize expressive performance. Second, we are developing innovative computer tools to capture some of the most intriguing aspects of harpsichord performance and Baroque repertoire. These can in turn be used to drive the computerized harpsichord in new kinds of interactive performances. Third, by further developing and refining the basso-continuo accompaniment, it will create a unique opportunity to compare a mechanical rendering of basso continuo to that of an expert performer to better appreciate the level of complexity and subtlety that skilled musicians can convey. In general, we hope to contribute to advances in knowledge and understanding for learning and training of harpsichord performance practice.

Keywords

score following; harpsichord; basso continuo; figured bass; performance practice

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MOTIVATION OF MUSICAL PRACTICE

*Peter J. Hamlin¹**

¹ Department of Music, Gonzaga University, USA

* Correspondence: hamlin@gonzaga.edu

Background

Developing and maintaining student motivation is one of the greatest challenges faced by music teachers. Motivation is essential to persevering and continuing to grow as a musician and engaging in efficient and effective practice. Re-

search on motivation has largely consisted of self-reported measures of internal and external motivation among musicians. Generally, studies of motivation orientations toward practice suggest that students are most motivated through satisfying internal needs, challenge, achieving personal goals, and mastering tasks for the sake of self-improvement. Students who are more committed to musical studies and who have positive musical self-perceptions are likely to practice more than those who do not.

Aims

The purpose of this study was to measure the degree of internal and external motivation as reported among music students enrolled in large collegiate level ensembles. The measures of internal and external motivation were also placed into a model to show their effects on the dependent variable of practice commitment.

Method

A survey was administered to undergraduate members of large collegiate ensembles located in the inland northwest United States. The survey instrument was developed to gather information regarding demographics, practice commitment, and constructs of motivation (mastery, intrinsic, individual, cooperative, ego, approach success, avoid failure).

Results

Descriptive statistics and reliability coefficients for all subscales were reported. Cronbach's alpha coefficients for all variables were moderate to high. Results indicated that intrinsic factors were preferred over extrinsic factors in relationship to motivation and musical practice. Participants scored highly on measures associated with mastery, intrinsic, and cooperative orientations. This is consistent with previous research. In addition, intrinsic factors had a higher positive impact on practice commitment.

Conclusions

The motivation needed to maintain interest in any activity includes aspects that are both intrinsic and extrinsic. When looking at this study in relation to other studies on motivation and deliberate practice, it is clear, however, that intrinsic motivation is an important aspect in students' continued musical growth. The use of intrinsic goals to motivate behavior encourages the probability of more dedicated and engaged musicians. Students must be provided with opportunities where they can feel successful and in which they can develop the confidence to continue developing skills in deliberative practice.

Keywords

deliberate practice; music performance; motivation; practice commitment; music education

MOTIVATION, PRACTICE, COMPETITIVE SPIRIT: AUSTRALIAN MUSIC UNDERGRADUATES' PERFORMANCE ABILITY SELF-PERCEPTIONS

Dominic G. Harvey^{1}, Jane W. Davidson², and Chenicheri Sid Nair³*

¹ School of Music, University of Western Australia, Australia

² Creative and Performing Arts, Melbourne Conservatorium of Music, University of Melbourne, Australia

³ Centre for Education Futures, University of Western Australia, Australia

* Correspondence: dominic.harvey@research.uwa.edu.au

Background

W.A. Mozart achieved musical mastery through a childhood committed to routines of daily deliberate practice, exercises in harmony, counterpoint, and the intensive study of composition. The 21st century musical mastery benchmark is three hours' daily deliberate practice, 365 days a year. Maintaining motivation to practice is challenging—it's not that enjoyable. University music study and socialization of undergraduates is a likely motivation enhancer. Being amongst like-minded musical peers can increase motivation and competitiveness. Spirited performance depends on self-perceptions and individual efficacy expectations. Research supports that self-identities of individuals are reinforced through the interactions at play within peer groups. Music undergraduates will compare themselves with peers, which may lead to changing goal expectations. Is it deliberate practice or "peer pressure" that most influences ability self-perceptions?

Aims

This study examined music undergraduates' performance ability self-perceptions as they progressed from commencement (2012) into the second year of the degree program (2013). It was assumed that music undergraduates' self-perception of performance abilities would be directly linked to hours of daily deliberate practice.

Method

Observations of self-perceived performance ability were made across the first 18 months of the degree program. Three Time Points were identified: (1) prior to commencement Semester 1, 2012 (n=47); (2) prior to continuing Semester 2, 2012 (n=35); and (3) prior to continuing Semester 1, 2013 (n=25). Variables were: ability compared to musical peers ("not as good" to "better"); daily commitment to deliberate practice ("less than 1 hour" to "more than 8 hours"); motivation to be more accomplished than peers ("disagree" to "agree"); and self-assessed perceptions of competitiveness ("disagree" to "agree"). Data were collected through pen and paper questionnaires distributed to the commencing 2012 music undergraduate cohort (N=50) at The University of Western Australia (UWA) School of Music (SoM).

Results

Undergraduates' motivation and competitiveness were positively and significantly correlated at Time Points 1 and 2. Spearman's rho analyses showed that performance ability and practice commitment were positively, but not significantly, correlated prior to commencement of the first year (2102). Performance ability and practice commitment were negatively, but not significantly, correlated prior to commencement of the second year (2013). Results suggested that performance ability self-perceptions were more linked to the motivation to achieve against peers and self-perceived competitiveness. Results suggested that performance ability self-perceptions were not linked to deliberate daily practice commitment.

Conclusions

Competition and the motivating environment of the peer group affected self-perceived music performance ability. The results did not suggest that ability self-perceptions were influenced by daily deliberate practice. Results suggested that familiarity with the degree by Time Point 3 influenced ability self-perceptions. Further investigation would establish whether this was influenced by the practical and academic loadings at various stages of the degree program.

Keywords

Australia; music; undergraduates; performance; ability

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MOUTHPIECE FORCE IN FRENCH HORN PLAYING

Takeshi Hirano^{1} and Hiroshi Kinoshita²*

¹ Faculty of Management, Osaka Seikei University, Japan

² Graduate School of Medicine, Osaka University, Japan

* Correspondence: hirano@osaka-seikei.ac.jp

Background

While playing the French horn, players press the mouthpiece to their lips at a certain force level. Brass pedagogy textbooks poorly describe the need for this force. A more extensive review of the literature also revealed little information on mouthpiece force during French horn playing.

Aims

The purpose of this study was to investigate the effect on pitch and dynamics of the magnitude of lip-pressing force on the mouthpiece during French horn playing.

Method

Fourteen trained French horn players, including a world-class horn player, participated in the study. A force-sensing mouthpiece for the French horn was developed by the authors to make a continuous measurement of lip-pressing

force while producing F2, F3, F4, Bb4, and F5 tones at *mf* dynamics and an F4 tone at 95 (*pp*), 100 (*p*), 105 (*mf*), 110 (*f*), and 115 (*ff*) dBs.

Results

The mean values of mid-sounding force for all participants during long tone production increased almost linearly from 3.5 N (F2) to 27.0 N (F5). As for the inter-player difference, the mid-sounding force at an F5 tone ranged from 18.1 N to 39.9 N, while the world-class player's value was 28.4 N. The force for the F4 tone played at *pp* and *ff* dynamics were 8.0 N and 15.9 N, respectively.

Conclusions

Mouthpiece force is an essential component for regulating the pitch of a tone on the horn, and possibly the other brass instruments. Proper control of this force should be equally important to embouchure formation. Mouthpiece force also plays a role in dynamic control, possibly resisting against increased blowing pressure with louder tone production. Inter-player difference in the force was also evident, most likely reflecting variation in the physical properties of their lips. These facts need to be taken into consideration by the educators and players of the horn.

Keywords

force-sensor mouthpiece; mouth pressing force; brass instrument; pitch control; inter-player variation

THE FEATURE OF STAGE FRIGHT EXPERIENCED BY MUSIC PERFORMERS: APPLICATION OF FACTOR ANALYSIS FOR UNIVERSITY STUDENTS

Yuuki Hirayama¹*

¹ Graduate School of Education, Hiroshima University, Japan

* Correspondence: d140027@hiroshima-u.ac.jp

Background

For music performers, it is important to be able to perform under pressure. According to Baumeister, choking under pressure was defined as performance decrements under circumstances that increase the importance of good or improved performance. The pressure was defined as any factor or combination of factors that increases the importance of performing well on a particular occasion. And choking refers to performance decrements under pressure circumstances. Choking under pressure is, in the context of staged performances such as in music, also called stage fright.

Aims

The purpose of this study was to examine the feature of stage fright experienced by music performers.

Method

A questionnaire survey of 102 university students (33 males, 69 females) majoring in music education was conducted. The average age of subjects was 22.6 years old (SD=3.84) and they had an average playing experience of 11.8 years (SD=5.50) on their major instrument. The questionnaire consisted of the following two items: (1) "the tendency to stage fright" in music performance on a real stage, and (2) the feature of psychological, physiological, and behavioral conditions in stage fright in music performance. The collected data were examined using the analysis software IBM SPSS Statistics 21.0.

Results

A strikingly high proportion of the respondents (76.5%) reported the tendency to stage fright in music performance on a real stage. The analysis found four primary factors: (1) perception of the own situation, (2) experience of cognitive shifts, (3) experience of physical insufficiency, and (4) attentional shifts and vicious circles. Also, as a result of analysis of variance, a significant difference between the stage fright groups was found concerning their tendencies from the perspective of two factors: "perception of the own situation" ($F_{(2,95)}=5.43, p<0.01$) and "experience of cognitive shifts" ($F_{(2,91)}=5.19, p<0.05$). Furthermore, as a result of analysis by multiple comparisons (Bonferroni method applied) it was shown that there was a significant difference between the group tending towards high stage fright and the group tending towards low stage fright ($p<0.01$).

Conclusions

The investigation has clarified that stage fright for music performers is a complex phenomenon caused by the interaction of psychological, physiological, and behavioral factors. In addition, it is worthy of mention that stage fright induced attentional shift, and its tendency was relevant to individual characteristics.

Keywords

stage fright; music performer; factor analysis; attentional shift; individual characteristics

THE CONDUCTOR AS MUSICAL GUIDE: GESTURE AND PERCEPTION OF MUSICAL CONTENT

Anita Kumar^{*} and Steven J. Morrison¹

¹ Laboratory for Music Cognition, Culture, and Learning, University of Washington, USA

^{*} Correspondence: kumarab@uw.edu

Background

Conducting pedagogy often depicts the conductor as an embodiment of music. Recent research has quantified this phenomenon through examination of the effect of expressive gestures on viewers' perceptions of conducted ensemble performances. This effect may be due, in part, to conductor gesture delineating and amplifying specific expressive aspects of music performances.

Aims

The purpose of the present study was to determine whether differing conductor gesture affects observers' focus of attention to contrasting aspects of ensemble performances.

Method

Two excerpts were arranged for a small conducted ensemble of seven players. Each excerpt featured two-part counterpoint of contrasting elements: (1) an ostinato paired with a lyric melody and (2) long chord tones paired with rhythmic interjections. Each excerpt was audio recorded in two forms in which the paired elements were alternated between upper and lower voices. Audio was recorded separately to ensure both lines were presented at equivalent amplitude.

Audio recordings were paired with video of two different conductors. Each used gesture appropriate to one or the other musical element for a total of 16 videos, distributed across two equivalent test forms. In each form participants heard the same voiced excerpt twice, once for each gesture condition (congruent with the upper or the lower line) for a total of eight items. Presentation order was such that no conductor appeared consecutively. Participants evaluated each excerpt along 10-point differential scales anchored by descriptive terms. These descriptions focused on elements of articulation, style, rhythm regularity, and phrase duration. Participants also indicated whether a lower timbre (tuba) or a higher timbre (flute) was dominant in the excerpt.

Results

Evaluations for each of the elements varied depending on the conductor's use of gesture. For three of the four excerpts, descriptions tended towards the end of the scales characterizing the pieces as more connected, regular, flowing, and long when conductor gesture was congruent with melody or sustained chords; descriptions tended towards disconnected, irregular, angular, and short when gesture was congruent with the ostinato or interjections. In the excerpt in which upper voices played long chords and lower voices played interjections, descriptions were not indicative of attention to gesture. This may be further explained by examination of the responses indicating attention to timbre; for this excerpt respondents identified the flute line as primary regardless of whether the flute was playing the line congruent with the gesture. For the other excerpts, voice primacy rating was not indicative of gesture attention, with both voices either evenly rated or rated contrary to gesture focus.

Conclusions

Observation of conductor gesture does play a part in perception of music performance. Listeners appear to be sensitive to the manner in which a conductor's gesture delineates musical lines, particularly as an indication of overall articulation and style.

Keywords

conductor; gesture; ensemble; perception; music

INTEGRATION OF FMRI, NEMG, AND MIDI DATA IN A PROFESSIONAL PIANIST WITH FOCAL DYSTONIA

Sang-Hie Lee^{1}, Dustin Hardwick², Juan Sanchez-Ramos³, Tuan Vu³, and Ryan Murtagh³*

¹ School of Music, University of South Florida, USA

² School of Physical Therapy and Rehabilitation Sciences, Morsani College of Medicine, University of South Florida, USA

³ Department of Neurology, Morsani College of Medicine, University of South Florida, USA

* Correspondence: slee@usf.edu

Background

Focal dystonia is a debilitating neurological condition that often afflicts pianists in the prime of their career. Disruptions in sensory integration and motor planning lead to involuntary movements, or “misfires” of certain muscles during piano playing. Despite the severity of the condition, questions remain unanswered.

Aims

The aim of the present study was to examine systematically the biomechanics, neurophysiology, and music performance outcomes in a pianist with focal dystonia in order to gain insights into correcting the misfire.

Method

We examined a 50-year-old professional pianist with focal dystonia in the left hand manifesting as involuntary 3rd finger extension. Biomechanics of the hand and arm were examined. Performance of temporal and dynamic touch control on the piano keys was quantified using MIDI data generated from a hybrid acoustic-electronic piano. Functional MRI was captured while (1) tapping on a flat board on his chest and playing a five-finger scale with the (2) affected and (3) unaffected hands. Intramuscular needle EMG (nEMG) was used to examine the activation pattern of the left extensor digitorum communis (EDC), and compared to the left extensor indicis proprius (EIP).

Results

Dystonic posturing of left 3rd finger extension was observed during fMRI and nEMG testing. Analysis of MIDI performance data showed decreased evenness of touch control, both temporal and dynamic. fMRI analysis demonstrated enhanced activity in contralateral (right) primary sensorimotor cortex, supplementary motor area, and parietal-occipital regions during simulated playing with the left hand. Ipsilateral (left) sensorimotor activity and parietal-occipital activity also increased with the left hand. Conversely, simulated playing with the right hand revealed markedly diminished activation of the contralateral (left) sensorimotor cortex and no activation of the ipsilateral (right) sensori-motor and parieto-occipital cortices. Indwelling nEMG analysis revealed hyper-activation of the left EDC with a distinct periodic oscillatory pattern during and persisting after playing which coincided with the dystonic posturing. These patterns were not demonstrated in the EIP.

Conclusions

Our case demonstrated that our pianist’s focal dystonia was associated with increased activity in the contralateral sensory and supplemental motor areas and a distinct oscillatory EMG activity in the affected muscle (EDC). Incorporating multiple modality data sets will provide novel insights into sensory integration and motor planning.

Keywords

pianists’ focal dystonia; fMRI; nEMG; multiple modality; sensory integration

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SPONTANEITY IN PERFORMANCE: EFFECTS OF THINKING ON EXPRESSIVE VARIATION IN TEMPO

Tania Lisboa^{1*}, Alexander P. Demos², and Roger Chaffin³

¹ Centre for Performance Science, Royal College of Music, UK

² Department of Psychology, McGill University, Canada

³ Department of Psychology, University of Connecticut, USA

* Correspondence: tania.lisboa@rcm.ac.uk

Background

One of the difficulties in teaching musical expression is that we have little understanding of its sources. In a recent case study, we noted that a student spontaneously began to play more expressively as a result of learning to attend to her own thoughts as she played. This suggests that musical expression may be a spontaneous product of thinking about musical intentions. Here, we examine the effect of thoughts during performance, i.e. performance cues (PCs), on the spontaneity of expressive timing.

Aims

Experienced performers maintain a balance between the automaticity required for technical proficiency and the spontaneity required for a compelling performance. An important goal of practice is to move beyond automaticity and be able to respond spontaneously to the opportunities and demands of each performance. To test this idea, we examined the development of spontaneity in a series of 24 performances as a musician prepared a piece for performance.

Method

As part of an earlier study, we recorded the entire practice (38 hours) and public performances of an experienced cellist (the first author) as she learned and performed the Prelude from J.S. Bach's *Suite No. 6* for solo cello, over a two-year period. Using half-bars as our unit of analysis, we measured tempo for 19 practice and six live performances. For this study, we measured spontaneity by taking the mean absolute difference of tempo from other performances. After the last performance, the cellist rated technical difficulty (by half-bars) and reported the location of the sections and subsections of the musical structure and of her PCs, i.e. the features she attended to during performance, distinguishing PCs for expression, interpretation, and basic technique. Mixed effect models evaluated the effects on tempo and spontaneity of musical structure, difficulty, practice, and PCs.

Results

The correlation of successive performances with each other and with the final public performance increased across performances, showing that, overall, tempo became more stable over time. The cellist played more difficult passages with less spontaneous variation in tempo, and played passages that received more practice with more spontaneity. There were tempo arches at multiple levels of hierarchical structure; arches within phrases were nested within larger arches across sections. Spontaneity followed the opposite trajectory: lower at beginnings and ends of phrases and higher in the middle. Tempo slowed and spontaneity increased at PCs for interpretation.

Conclusions

The cellist combined automaticity with spontaneity, relying on automaticity in more difficult passages and working to achieve spontaneity through more practice in other places. Spontaneity was higher and tempo slower at beginnings of sections and phrases and at interpretive PCs. We suggest that slowing at these locations provided time to settle on the interpretative nuances of timing and dynamics for the upcoming passage. By collecting her thoughts, the cellist created both the temporal grouping of notes into phrases and the variation in timing that signals spontaneity to an audience. This suggests that students might be taught to play more expressively by learning how to develop interpretive PCs.

Keywords

practice; spontaneity; performance cues; expression; performance

ALCOHOL MISUSE: PREVENTION AND RECOMMENDATIONS FOR ALCOHOL POLICIES IN CONSERVATOIRES

*Jennifer R. Lisle¹**

¹ Faculty of Public Health, Royal Colleges of Physicians, UK

* Correspondence: jrhawk@globalnet.co.uk

Background

Lifestyle risk factors such as smoking, poor diet, obesity, alcohol, physical inactivity, and mental ill health are responsible for a huge burden of disability and loss of wellbeing. These major health risks, which affect the population as a whole, also affect the lives of performers, their ability to perform, and the quality of their performance. The performing arts have a long-established culture of generous alcohol consumption which, even in small amounts, can compromise motor skills and negatively affect the playing of a musical instrument. Alcohol has wide-ranging effects on health, both acute and chronic. It is a psychoactive drug, potentially addictive, and can lead to dependency. There is little published evidence that conservatoires have been proactive in tackling alcohol misuse by establishing alcohol policies.

Aims

This paper will consider the steps that can be taken to address alcohol misuse among students in conservatoires. The focus will be on student musicians and prevention of alcohol-related harm through establishing a conservatoire alcohol policy.

Main contribution

The evidence base for early prevention of alcohol misuse and the rationale for a conservatoire alcohol policy will be presented.

A conservatoire is a work environment in which students will spend their formative years. Young people are at greater risk of harm caused by alcohol and student populations are more likely to engage in risky drinking. A study found that high levels of alcohol consumption at medical school predicted high levels of alcohol use later in life, suggesting that a policy concerned with student alcohol consumption would also have implications for future health and wellbeing.

The responsibilities of the conservatoire focus on provisions of “education training and facilities” through which students can achieve excellence in performance and a qualification. The conservatoire also has a responsibility to safeguard student health and wellbeing through creating a health-promoting work environment. Establishing a school-based policy and code of conduct for alcohol misuse involving both student and staff representatives is an essential step towards prevention of alcohol-related harm among students in conservatoires, through joint negotiation to promote awareness and to indicate throughout the conservatoire that alcohol problems will be addressed via early intervention and proactive support for students. Recommendations will be proposed.

Implications

The conservatoire is an important place to prevent or reduce alcohol-related harm in students and a clear policy is an effective means of tackling alcohol issues. A policy concerned with student alcohol consumption could also have implications for the future health and wellbeing of musicians.

Keywords

alcohol; misuse; prevention; conservatoires; alcohol policies

TOWARDS A COLLABORATIVE ETHNOGRAPHY OF CHAMBER MUSIC PERFORMANCE: A COGNITIVE AND SOCIO-ANTHROPOLOGICAL STUDY OF AMATEUR WESTERN CLASSICAL MUSICIANS IN JAPAN

Masaki Matsubara¹ and Yuki Imoto²*

¹ Faculty of Library, Information and Media Science, University of Tsukuba, Japan

² Faculty of Science and Technology, Keio University, Japan

* Correspondence: masaki@slis.tsukuba.ac.jp

Background

Numerous studies within psychology have explored aspects of musical communication, such as cues, synchronization and leadership, and emotion. Such studies have generally been based on quantitative, “disembodied” third-person methods, although Terasawa argued for the need to consider socio-cultural contexts when studying emotional aspects of musical communication.

Meanwhile within ethnomusicology and anthropology, experiential, participatory methods that seek to close the distance between analyst and subject have been developing; for example Lassiter’s “collaborative ethnography,” Feld’s “dialogic editing,” Barz’ volume on reflexive fieldwork, and Tobin and colleagues’ “multivocal ethnography.”

Aims

In this research we explored the possibilities of combining the approaches of cognitive science and socio-cultural anthropology for a more holistic description of the experience of chamber music performance. We conducted a collaborative ethnographic case study of chamber music performance where the researchers themselves were performers. We aimed to thus propose a methodological framework that fully incorporated subjective experience.

Method

The two authors are members of a group of eight amateur string musicians, who have been playing together for 10-15 years in Japan. Fieldwork (which began in February 2014) involved our participation in several cycles of “practice to performance” of chamber music with the group. One cycle included three to four recorded practice sessions of approximately two hours each, followed by a recorded, reflexive discussion session. The cycle ended with a recorded stage performance with an audience of 20-30 people, which was also followed by a discussion session.

We relied on a multi-method approach. Qualitative approaches included observation (both self and other), interviews (both group and individual), and narrative analysis. Quantitative approaches included timing and gesture analysis of performances and protocol analysis of the recorded discussion sessions. All results were shared and discussed among the ensemble members to realize a collaborative approach.

Results

We have completed one cycle of “ensemble practice to performance.” Some recurrent “keywords,” or metaphors, which players used to explain non-verbal musical experience verbally (in Japanese) have started to emerge. One is the term “ma” (negative in-betweenness). Another is “iki ga au” (literally translated as “the breath is synchronized”). The third is “ba” (a shared space for emerging intersubjectivity), used to discuss how the “feel” of the space and setting influences the performance.

Conclusions

Our study identifies the possibilities and limits of interdisciplinary approaches. We call for the need to discuss “what are the realities and experiences that can be shared beyond subjective experience,” and “how can they be shared,” whether through music, through collaborative ethnography, or through quantitative measurement.

Keywords

collaborative ethnography; chamber music ensemble performance; intersubjectivity; musical communication; interdisciplinary dialogue

DYNAMICAL SYSTEMS PERSPECTIVES ON RHYTHMIC ARTISTIC MOVEMENTS: EVIDENCE FROM STREET DANCERS AND DRUMMERS

Akito Miura^{1,2}, Shinya Fujii³, Haruka Tanosaki⁴, Takeshi Funahashi⁴, Masahiro Okano⁴, and Kazutoshi Kudo⁴*

¹ Japan Society for the Promotion of Science, Japan

² Graduate School of Education, Tokyo Gakugei University, Japan

³ Canadian Partnership for Stroke Recovery, Sunnybrook Research Institute, Canada

⁴ Department of Life Sciences, University of Tokyo, Japan

* Correspondence: akito.miura@gmail.com

Background

Dancers and musicians express their emotions and feelings through organized patterns of body movements. Understanding how the organized rhythmic artistic movements emerge from the human motor system, which is called mo-

tor control research, is fundamental to the progress of performance science and to provide suggestions for dance and musical training.

Aims

This presentation aims to introduce a theoretical framework called the dynamical systems approach, which was originally developed to describe pattern formations in nature, for understanding the motor control of rhythmic artistic movements.

Main contribution

Motor control research with the dynamical systems approach has shown that rhythmic body movements of humans have a tendency to be entrained to a specific coordination pattern, which is sometimes different from an intended pattern. The unintentional entrainment may prevent unskilled beginners from performing freely according to emotions and feelings. We have shown that skilled street dancers and drummers are able to overcome this unintentional entrainment with practice and perform intended patterns *ad arbitrium*. Importantly, the differences in patterns of rhythmic movements between the unskilled and skilled performers can be successfully described by the dynamical systems model.

Implications

We will also provide suggestions for effective ways of training in dance and musical education according to a series of research on motor control with the dynamical systems approach.

Keywords

street dance; drum; motor control; sensorimotor synchronization; dynamical systems approach

INTERSECTIONS BETWEEN POPULAR MUSIC AND ART MUSIC: APPLICATIONS OF GYÖRGI LIGETI'S DIVISIVE RHYTHMS TO THE MODERN DRUMSET

Karla Eva Pfüetzenreuter^{1*}

¹ Department of Music, Federal University of Bahia, Brazil

* Correspondence: karla.pfuetzenreuter@gmail.com

Background

In research carried out among Brazilian drumset students and instructors in 2014, I found that the participants perceived a frequent absence of specific drum scores within the context of popular music, and claimed that existing scores are lacking in detail. Thus, drummers ended up creating their musical parts themselves by means of generative processes that may be of both compositional and improvisational natures and comprise skills that some might consider as restricted to the drummer's epistemic scope. While investigating such tools, one faces obstacles such as: (1) a scarcity of directed drumset literature that addresses the topic specifically; (2) the fact that most drummers do not clearly unfold their generative processes when providing insights; and (3) the fact that generative processes are sometimes not reflected by drummers.

In order to broaden the instrumentalist's perspective on possible sources for compositional tools I propose one of György Ligeti's works for piano, which themselves are known for their rhythmic sophistication and a merging of multi-cultural influences, such as east-African and Indonesian gamelan music, and also by mathematical theories of fractal geometry and works by Bela Bartók. Therefore I chose Ligeti's *Etude for Piano No. 4, "Fanfares,"* written in 1985 and dedicated to Volker Banfield, to serve as a model for the elaboration of a corresponding drum part. The piano etude stands out for its characteristic divisive rhythm occurring as a rhythmic ostinato in 4/4. This ostinato is built by eight eighth-notes that are grouped into units of 3 + 2 + 3 notes.

Aims

The aim of the present study was to develop a drum part using a musical piece that did not consider this instrument specifically. Beginning with an analysis of the piece, I conceived a drum part in a second step. Afterwards I examined the compositional decisions made during the conception both from a drummer's and from a composer's perspective.

Main contribution

The present study contributes to the enhancement of the drummer's generative process and to their self-understanding both as composer and performer. The examples given in this investigation should enrich the drummer's knowledge about compositional strategies applicable to different musical styles and encourage them to consid-

er sources outside of stylistic boundaries that are given by categorizations such as “Art Music,” “Popular Music” or “Folkloric Music.”

Implications

Through the elaboration of a conceptual and reflected drum part, the present investigation made clear that drumset performance is not necessarily bound to improvisation (i.e. extemporaneous composition), but rather is informal in nature given the instrument’s limitations in transporting definite pitches.

The study implied an exchange both between the interconnected areas of composition and musical performance and different musical styles instead of pursuing their separation and stressing their divergences. I demonstrated this exchange by exemplifying their valuable contribution demonstrating possible intersections.

I hope to stimulate further studies on compositional strategies for the drumset, which would generate knowledge relevant both for drummers and composers.

Keywords

Györgi Ligeti; *Fanfares*; divisive rhythm; drumset; composition

EEG-BASED CLASSIFICATION OF MUSIC-INDUCED EMOTIONS IN DANCERS: A MACHINE LEARNING APPROACH

Rafael Ramirez^{1*} and Karen Lacey²

¹ Department of Information and Communication Technologies, Pompeu Fabra University, Spain

² Musical Theatre, LASALLE College of the Arts, Singapore

* Correspondence: rafael.ramirez@upf.edu

Background

Dance is about connecting and synchronizing movement to music. While dancing, performers synchronize to music as if their bodies and the music were a single entity. Thus, a natural question is what kinds of neural synchronizations occur in the dancer’s brain as they listen to the music. In this paper we investigate induced emotion in dancers, as detected by their brain (EEG) activity, while they listen to different types of music. In particular, we compare their emotional response to music for which they are expert dancers and other types of music with emotional content.

Aims

The aim of this work was to investigate, with a quantitative approach, the emotion induced by music in dancers. In particular, we are interested in quantifying the difference in emotional response (decoded from brain activity) when dancers listen to music to which they usually dance, compared to when they listen to other types of music.

Method

EEG data in this study were collected from four healthy subjects (one male and three females; average age=38) while listening to music excerpts with emotional content and dancing music excerpts. Subjects listened to four 30-second fragments of selected film soundtracks with clear emotional content in all four quadrants of the arousal-valence emotion plane (happy, fear, sad, and tender) and one dancing music fragment (salsa or tango depending on the dancer expertise). We then filtered and processed the signal in order to extract emotion-related features and applied machine learning techniques to classify the emotional states produced by the different music stimuli. We compared the accuracies of the classifiers to determine which tasks are easier to classify, in order to determine what type of music has a stronger emotion-induction effect in dancers.

Results

For the Happy, Fear, Sad, Tender, and Dance classifiers, the average accuracies obtained with Support Vector Machines (radial basis function kernel) classifier were 66.92%, 51.36%, 64.87%, 63.35%, and 77.48% respectively. For these classifiers the best subject’s accuracies were 69.26%, 55.04%, 69.28%, 67.86%, and 83.33% respectively. The best classifier in terms of accuracy was Dance, which may be interpreted by the fact that dancers experience stronger emotions when listening to music to which they usually dance compared to other music with emotional content. On the other hand, the Fear classifier did not produce accuracy better than random, which may be interpreted by the fact that fear is an emotion which is difficult to induce by only listening to music in a controlled environment.

Conclusions

We have compared the emotional response of four dancers to music to which they normally dance and other types of music with emotional content. Our results indicate that EEG data obtained contain sufficient information to train successful classifiers and that dancers experience stronger emotions when listening to music to which they usually dance compared to other music with emotional content.

Keywords

emotions; music; dance; brain activity; machine learning

Acknowledgments

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MOTION FEATURE EXTRACTION IN THE SELF-TRAINING PROCESS OF NIHON BUYO USING MOTION CAPTURE

Yukitaka Shinoda^{1}, Kento Sakai¹, Yuki Mito², Reishi Watanuma³, Toru Ozawa², and Mieko Marumo²*

¹ College of Science and Technology, Nihon University, Japan

² College of Art, Nihon University, Japan

³ Graduate School of Law, Hitotsubashi University, Japan

* Correspondence: shinoda.yukitaka@nihon-u.ac.jp

Background

The passing on and preserving of advanced technical skills has become a key issue in a variety of fields. Today, studies using motion capture to analyze motion in “advanced skills that the body remembers through practice,” which can be called “physical intelligence,” are being reported. In Nihon Buyo, a traditional dance form in Japan, there are many different schools and it is important that the features of each school be objectively evaluated. Furthermore, to ensure that techniques and skills that have been traditionally cultivated be passed on to future generations, it is thought that introducing a scientific educational system could lead to the future growth of this art form.

Aims

The aim of our research was to perform visualization and feature extraction of dance movements in the self-training process of Nihon Buyo. In the study described here, we obtained the body movements of dancers every half-year over a two-year period using an optical motion capture system and a floor-reactive-force detector, and we developed a dance-movement visualization system for displaying the body movements of a young performer in a self-training process and extracting features from those dance movements.

Method

The experimental equipment consisted of an optical motion capture (MC) system and force plates (FP). The MC system used 12 infrared cameras to measure the three-dimensional positions of 42 markers attached to the performer. The center of gravity (COG) of the performer was calculated from the three-dimensional positions of those markers. The targeted dance movement was Osuberi, one of the basic techniques in Nihon Buyo. The performer was a female dancer in her 20s belonging to Hanayagi-ryu, one of the five main schools of Nihon Buyo.

Results

We used the data on dance movements that we obtained every half-year over two years to show how the visualization system that we developed could be used to compare dance movements performed at four different times. Furthermore, in the feature extraction of dance movements, we converted horizontal and rotational movements of the performer’s body to a corrected coordinate system and compared the time-series waveforms of the performer’s COG and COP in the left-right direction and front-back direction. It was found that the correlation coefficient between COG and COP tended to increase in both the left-right and front-back directions over the two-year period from the first to the fourth set of measurements.

Conclusions

We showed that the visualization system that we developed has a function for displaying and comparing dance-movement data measured on an ongoing basis. In addition, the results that we obtained by measuring the dance movements of a young performer in the self-training process of Nihon Buyo over a two-year period revealed that the

correlation coefficient between COG and COP tended to increase in both the left-right and front-back directions for the Osuberi movement, one of the basic techniques in Nihon Buyo.

Keywords

motion capture system; Nihon Buyo; center of gravity; center of pressure; educational support system

ASSESSMENT CRITERIA FOR AN ORCHESTRAL EXCERPT FOR FLUTE IN AN AUDITION SITUATION: FOR ENHANCING THE LEARNING AND PRACTICING OF THE AUDITIONEE

Andre Sinico¹* and Cristina Capparelli Gerling¹

¹ Graduate Music Program, Federal University of Rio Grande do Sul, Brazil

* Correspondence: asinico@hotmail.com

Background

Worldwide, orchestras hire instrumental musicians through a grueling process of auditions. Well-funded orchestras demand no less than perfection from their members, causing the level of expectancy and stress of those applicants that get called to audition to reach new heights with each job opening. Competitions of this nature are among the toughest a musician will face. Among the excerpts chosen for flute auditions, Debussy's *Prélude à l'après-midi d'un faune* ranks highest among the most frequently requested piece for orchestral positions in the USA and Brazil. Can the assessments and discussions of criteria used by professional flute players in Brazil for this orchestral excerpt be used as a tool to enhance the learning and practicing of flute students preparing for auditions?

Aims

This study focused on identifying and assessing criteria selected by professional flute players fluent in Brazilian Portuguese, be they orchestral players or flute teachers in music schools, regarding the qualitative demands of the orchestral excerpt *Prélude à l'après-midi d'un faune* as an audition piece in order to better prepare students to face the task.

Method

A three-part questionnaire was developed with the aid of SurveyMonkey®. The first part consisted of flute players choosing at least four assessment criteria out of nine categories (breathing, phrasing, expressivity, timbre, tuning, vibrato, dynamic, agogic, and other) randomly listed. The second part consisted of a request to rank the level of each assessment criteria on a five-point Likert scale. Thirdly, participants were asked to describe the reasons for having chosen their individual assessment criteria. The questionnaire was sent to forty-eight flute players including Brazilian orchestral musicians and flute teachers at music schools. Among the 25 respondents there were seven females and 18 male flutists and teachers. Data were analyzed using descriptive statistics and qualitative methods.

Results

The total score for the second question, dealing with the level of importance assigned to each one of the categories, equaled 125. Intonation reached a total score of 114 (91.2%), followed by phrasing at 113 (90.4%), expressivity at 111 (88.8%), timbre at 104 (83.2%), and vibrato at 97 (77.6%). Breathing and dynamics tied at 93 (74.4%). Last came agogic (rubato) at 85 (68%). Other categories did not reach significance among this sample of flutists. Some of the respondents mentioned that intonation, timber, vibrato, and dynamics could be grouped as a single criterion for evaluation. In addition, expressivity and phrasing were also considered indivisible for the purposes of qualitative evaluation of the excerpt in question. It seems fair to conclude that technical-interpretive aspects such as timbre, pitch, and vibrato contribute to breathing control and level of expressivity.

Conclusions

Brazilian flute teachers and orchestral players in this sample ranked intonation, phrasing, and expressivity as the three main elements that determine the quality of the playing of Debussy's *Prélude*. It may follow that this knowledge of the assessed criteria for this orchestral flute excerpt, in combination with discussions in the literature, may contribute to enhance the learning and the quality of performances at future auditions for orchestral positions.

Keywords

assessment criteria; orchestra excerpt; flute; audition; Debussy

LOST IN SOUND: IN INTERVIEW STUDY ON THE INTERACTION BETWEEN DJ AND CROWD

Susanne Stamm^{1} and Andrea Mühlig²*

¹ Department of Music Education, University of Oldenburg, Germany

² Department of Educational Psychology, University of Oldenburg, Germany

* Correspondence: susanne.stamm@uni-oldenburg.de

Background

Nowadays, DJing can be linked to international popularity, producing and releasing music, and exceptional performances. Electronic Music has become a global phenomenon and DJs are quickly-growing celebrities. David Guetta, who, at the time of writing, has sold over six million albums and fifteen million singles worldwide, is the best example of this kind of dance-pop collaboration. Popular scientific and docufictional texts have documented many aspects of the performative space of nightclubs such as Berghain, Tresor, or Watergate. Thereby the focus lies on the construction of techno history and on the question of how, and by whom, Electronic Music as a cultural phenomenon is constantly being renegotiated.

Aims

The main objective of the study carried out was to investigate the interaction between a DJ and a crowd from the DJs' perspective. We wanted to know more about these interaction processes beyond the self-experience discourse. Contrary to the claim of Airen, we assumed that the phenomenon of Electronic Music is tangible not only in a night club, but indeed can be scientifically reconstructed. To what extent are DJs considering different locations, crowds, the atmosphere of the event, and stage time in their planning? Which strategies are known and used by the DJs to interact with the crowd? How important is the interaction with the crowd for the DJs? As there is little known about DJ-crowd-interaction (especially in a non-technical manner), we want to fill this gap by aiming at a richer understanding of the work contexts/performing of DJs.

Method

We decided to focus on club DJs who perform mixes of Electronic Music that are suitable for socializing and dancing for long periods of time. We assume that semiprofessional DJs are having more problems and interruptions to deal with than professional DJs. Therefore we selected 20 semiprofessional DJs from major German cities. We conducted episodic interviews, which focus on concrete situations appearing throughout a performance. These interviews combine episodic knowledge, which is linked to concrete circumstances (e.g. time, space, people) and semantic knowledge, which is rather more decontextualized from specific situations (e.g. general beliefs about good DJ-performances). The DJs were interviewed in writing. The data were analyzed using qualitative content analysis following Mayring.

Results

The data are still under evaluation. There are different ways (technical/non-technical, verbal/non-verbal, scheduled/spontaneous track selection) of interacting with the crowd. The most transmitted signal from performer to listeners was the musical sound. DJs and audiences do interact but DJs prioritize these interactions highly differently. It has been shown that, in comparison to other genres, the crowd itself has the opportunity to communicate directly with the DJ. We assume that a complete evaluation will give us evidence on how DJs work with problems and interruptions and how they still manage to perform professionally.

Conclusions

The obtained results and the achieved understandings give us clues for future studies: It would be interesting to discover if there are similarities and differences in interacting with the crowd regarding other styles of music or non-musical performances.

Keywords

music performance; DJ; electronic music; interaction; episodic interviews

DECLAMATION IN THE SONGS OF MUSORGSKY: BASED ON ACOUSTIC ANALYSIS

Kanako Takeshita^{1}*

¹ Graduate School of Education, Hiroshima University, Japan

* Correspondence: do93167@hiroshima-u.ac.jp

Background

The songs of Russian composer Modest Musorgsky (1839-1881) are often cited as following the natural rhythm and intonation of Russian and resembling spoken language. However, in preceding research this has usually been shown through researchers' own auditory impressions, and, in addition, is mixed with non-linguistic information such as emotion and individual taste. Thus, the systematic description of imitation of Russian intonation in Musorgsky's works lacks objectivity and is insufficient.

Aims

This research aimed, through comparisons with the sound data of the Russian language, to gain a foothold in developing a systematic understanding of the declamation in Musorgsky's songs by examining them from an objective perspective.

Method

Musorgsky's career as a composer was divided into four periods, and five songs from each were selected for analysis. For comparison, 13 songs by Musorgsky's contemporaries were also analyzed. Recordings were prepared of Russian native speakers reading the texts from the songs aloud, and phrase boundaries and centers of the intonation were identified from the fundamental frequency contours. Then, the read style speech and melody line were examined for comparison in terms of phrase boundary, rhythm, and pitch, and cluster analysis was performed with the results. It was predicted that in songs from Musorgsky's second and third periods, during which he is considered to have been strongly interested in imitating the intonation of spoken Russian, there would be strong resemblance.

Results

In terms of rate of agreement between phrase boundaries, no significant difference was discovered among the songs that were subject to comparison. However, in terms of rhythm, songs from the second and third periods showed significant resemblance to speech in comparison with other songs. In terms of pitch, melody lines of songs from the third period showed the greatest resemblance with the read style speeches, followed by songs from the second period and those of Tchaikovsky. Four clusters were used in the cluster analysis, and nine songs were categorized into a "matching-type" cluster. Three among them were from the second period and four from the third period, and Musorgsky himself wrote all of their lyrics.

Conclusions

As predicted, songs by Musorgsky from the second and third periods showed a strong tendency to resemble the intonation of spoken Russian. Compared to the second period, the third period had a higher rate of resemblance in terms of pitch. It is thought that after imitating the rhythm of Russian, Musorgsky went on to refine the imitation from the perspective of pitch. Cluster analysis also indicated that songs whose lyrics were written by Musorgsky himself may have a higher resemblance with the intonation of spoken Russian.

Keywords

Musorgsky; Russian intonation; declamation; acoustic analysis; songs

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THE PRECISION OF FUNDAMENTAL FREQUENCIES OF VOCAL PERFORMANCES WITH THE PARALLEL VOICE BY THE PERFECT FIFTH: A COMPARISON TO THE MAJOR THIRD

Minoru Tsuzaki^{1*}, Hana Ohmori¹, Hidetoshi Ue², and Sachiko Kuga³

¹ Faculty of Music, Kyoto City University of Arts, Japan

² Faculty of Arts, Kyoto City University of Arts, Japan

³ Kyoto University of Foreign Studies, Japan

* Correspondence: minoru.tsuzaki@kcu.ac.jp

Background

The fifth chord in the diatonic scale is considered to be "consonant" because the ratio between the fundamental frequencies is 2/3, which increases the number of shared harmonics to the maximum, second only to the octave. One might sometimes even fail to notice the existence of two sounds in the perfect fifth. This might lead to the prohibition of the parallel fifth in counterpoint pedagogy where the independence of two melodies is to be assured. This lack of

independence could impose some difficulty for singers to segregate their own voices from an accompanying voice and result in deteriorated vocal performances due to the lack of efficient auditory feedback.

Aims

This study was aimed at investigating whether the deterioration mentioned above actually occurs. Behavioral experiments were designed where semiprofessional singers were required to sing familiar tonal melodies with accompaniments sung a perfect fifth lower.

Method

Ten semiprofessional singers participated in the experiments where they were required to sing four Japanese familiar melodies with an accompanying part generated by a vocal synthesizer. They were graduate/undergraduate students majoring in the vocal performance at the Kyoto City University of Arts. In the experimental condition, the accompanying part was set below the target melody by a perfect fifth (P5). In the comparison, a control condition, the accompanying part was set below the target melody by the major third (M3). The vocal sounds of each participant were recorded digitally through a headset microphone. The accompanying parts were digitally played back and fed to each participant through headphones. To provide auditory feedback of singers' own voice as accurately as possible, the voice of each participant was also picked up by another stand microphone and was fed back to each participant, mixed with the accompaniment.

The fundamental frequency (F0) was estimated for each vocal performance with a 5ms frame shift. The precision of the vocal performances was estimated by calculating the deviation of F0 from a virtual "correct" performance, which was provided by the vocal synthesizer.

Results

First, the absolute values of the deviation were submitted to ANOVA with the interval factor (i.e. P5 or M3) as a within-subjects factor. The interval factor was significant ($F_{1,9}=10.12$, $p<0.011$). The degree of deviation was larger for the P5 condition than for the M3 condition. Secondly, the kurtosis was obtained for the distribution of the deviations for each interval and each participant, and a t-test with the corresponding pair was performed. The interval factor was statistically significant ($T_9=-2.359$, $p<0.043$), and the kurtosis for the P5 condition was smaller than that for the M3 condition.

Conclusions

The results suggest that the participants had more difficulty in controlling their F0 as intended with the accompaniment below the target by the perfect fifth than with the accompaniment below by the major third. The parallel fifth might be prohibited not only to establish the perceptual segregation of two melody lines but also to prevent singers from losing their control.

Keywords

vocal performance; fundamental frequency control; parallel fifth; singing; pitch

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A PERCUSSIVE MUSICAL INTERFACE FOR A QUADRIPLEGIC PATIENT

Zacharias Vamvakousis^{1} and Rafael Ramirez¹*

¹ Department of Information and Communication Technologies, Pompeu Fabra University, Spain

* Correspondence: zacharias.vamvakousis@upf.edu

Background

The positive impact music performance has on a person is well known. Unfortunately, people with motor disabilities are sometimes excluded from these benefits. Nowadays, using open source technology and low-cost sensors, it is possible to construct portable interfaces for people with motor disabilities adapted to their special needs. In this paper we describe a personalized musical interface constructed for a person with quadriplegia and we discuss the impact it has had on his quality of life after eight months of use.

Aims

This study aimed to demonstrate that low-cost digital musical instruments can improve the quality of life of people with motor disabilities. It also explored the advantages and drawbacks a digital musical instrument might have when compared to a traditional one, for the specific case of people with disabilities.

Method

We came in touch with a person with quadriplegia that expressed the desire to be able to play music again four years after a car accident that caused his injury. This person used to play the guitar at a semi-professional level. After his accident he was no longer able to move his upper body. Fortunately he still had limited control over his arms, but he could not move his fingers. As this person still had a degree of control over his upper limbs, from the beginning we moved towards the direction of implementing a percussive interface played with xylophone sticks mounted on his hands. The advantage of a digital percussive musical instrument when compared to an acoustic one was that the knock sensors used to capture a hit could easily be mounted in any position of the interface. Initially we made various mock-ups of possible interfaces that our subject tried, and did quantitative measurements on the temporal and spatial accuracy of each of them. Then we implemented the selected interface using knock-sensors, an arduino board, an analogue multiplexer for arduino, and a wooden construction on which the sensors and electronics were mounted. The final interface consisted of 19 knock-sensitive buttons: 18 chromatic notes and one for switching to a settings layer. The arduino micro-controller sent MIDI messages to a synthesizer running on a computer. A synthesizer was also implemented in a Raspberry Pi single-board computer for sonifying the interface without the use of a normal computer, making it portable. Eight months afterwards we visited the patient once more and evaluated the impact the musical interface had on his quality of life.

Results

The user made use of the interface on a daily basis, using it as a MIDI controller to record his own compositions on his computer. He also used the interface in order to play music along with friends. He stated that the interface had a big positive impact on his psychology, as it helped him be creative and express himself through music. It also enhanced his social life, as he was able to play music with other musicians.

Conclusions

Low cost personalized music controllers may be easily implemented, providing people with motor disabilities the opportunity to play and compose music, thereby improving their quality of life.

Keywords

quadriplegia; music performance; quality of life; musical interface; arduino

Acknowledgments

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ANALYSING MUSICAL TEACHING STRATEGIES: AN OBSERVATIONAL STUDY IN ACOUSTIC GUITAR MASTERCLASSES

*Ricieri Carlini Zorzal¹**

¹ Department of Arts, Federal University of Maranhão, Brazil

* Correspondence: riciviolo@terra.com.br

Background

Even though musical instruments' individual classes in conservatoires and schools of music have been investigated by many authors, there is still demand for specific studies regarding the unique characteristics of masterclasses. One of these characteristics can be the kind of teaching strategies used.

Aims

The current study aimed to answer the following question: what are the strategies for teaching the acoustic guitar through masterclasses?

Method

To address this question, the current study began with a review of the specialized literature in specific studies regarding musical teaching strategies. After that, a qualitative orientation defined as a non-participative observation in

collective studies was planned. Thereby, 40 acoustic guitar masterclasses were recorded in loco by the researcher. The objective of this stage was to study in detail 10 selected cases from a previous sample through the means of the transcription of the masterclasses followed, by the classification of the musical teaching strategies. The analysis was realized with the software package NVivo.

Results

Three main musical teaching strategies categories were identified in this study, and each one was classified according to subcategories. Firstly, the strategies incorporating the use of words comprised figurative language instruction, literal language instruction, and musical terminology language instruction. Secondly, the strategies incorporating the use of sounds comprised instrumental demonstration, vocal demonstration, and onomatopoeia. Thirdly, the strategies incorporating the use of gestures comprised musical gestures, markings in the score, visual contact, touch, variation in proximity, facial expressions, and silence.

Conclusions

This study identified many similarities between the teaching strategies employed during musical instrument teaching through masterclasses and those applied in individual classes at conservatories and schools of music, as previously acknowledged by the specialized literature. Among these similarities were the complementary relationships between verbal and non-verbal communication, and the body language used. Furthermore, the frequency and magnitude of the strategies used during the masterclasses depended on each instructor's teaching style, especially when considering body language strategies.

However, it was observed that the particularities of the masterclass were not dependent on the types of strategies used. It was suggested that the particularities of the masterclass were associated with the way in which such strategies are used, and how this influences the relationship established between student and instructor in a public context. Further study should be conducted to provide the necessary explanations for this observation.

Keywords

musical education; performance; musical teaching strategies; masterclass; acoustic guitar

Acknowledgments

This study has been supported by the CNPq and FAPEMA.

Symposium Making music for mental health

MAKING MUSIC FOR MENTAL HEALTH: THE PSYCHOLOGICAL IMPACT OF LEARNING TO DRUM

Sara Ascenso¹, Rosie Perkins^{1}, Daisy Fancourt^{1,2}, Louise Atkins¹, and Aaron Williamon¹*

¹ Centre for Performance Science, Royal College of Music, UK

² Psychobiology Group, University College London, UK

* Correspondence: rosie.perkins@rcm.ac.uk

Background

Music learning has been linked with enhanced psychological wellbeing across clinical, educational, and community settings. Programs with vulnerable populations have shed light on its promising effects on positive emotions and resilience. However, the precise *mechanisms* that mediate music's influence are still to be clarified. Furthermore, recent models of wellbeing have moved beyond the centrality of positive affect, with evidence now accounting for the role of meaning, accomplishment, and social inclusion in the building of optimal functioning. Today, wellbeing stands as the combination of *feeling* well and *functioning* well, yet research into music interventions has still to address the complexity of this multidimensionality. Finally, the impact of music interventions has targeted the typical receiver of support services, and not the entire caring system. Acknowledging the psychological burden that a caring role encompasses, it is timely to welcome carers into such initiatives.

Aims

The aims of this research were twofold: (1) to explore the extent to which group drumming interventions translate into multidimensional change in wellbeing for mental health patients and carers, and (2) to shed light into the mechanisms that mediate such change.

Method

The study consisted of two phases involving mental health patients and carers. Phase 1 was an experimental study of six weeks of group drumming involving 31 participants while Phase 2 was a controlled study of 10 weeks of group drumming involving 30 experimental participants and 15 control participants. A mixed-methods approach was adopted. Data on wellbeing indicators were collected before and after each intervention through the *Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS)*, *Hospital Anxiety and Depression Scale (HADS)*, *Connor-Davidson Resilience Scale (CD-RISC)*, and the *Secker Scale for Social Inclusion*. Qualitative data were collected in both phases via: (1) semi-structured interviews pre and post intervention (n=11), (2) focus groups at the end of each intervention (n=29), and (3) participant and non-participant observation of all sessions. Data were analyzed through repeated measures ANOVAs and inductive thematic analysis.

Results

Results across both phases pointed to an increase in overall wellbeing, with significant improvements in WEMWBS ($p < 0.05$) and CD-RISC ($p < 0.05$) and reductions in HADS ($p < 0.01$). Drumming enabled hedonic and eudaimonic dimensions of wellbeing for the two groups. Three superordinate themes accounted for the mechanisms mediating this change: (1) the specificities of *drumming*, as a physically intense and grounding experience and a vehicle for non-verbal communication; (2) *the group*, through connectedness, a sense of belonging, acceptance, safety, care, and socialization; and (3) the process of *learning* through embodiment, freedom, and the dissolution of the concept of mistakes. Results accounted for transferability of change to contexts outside the project.

Conclusions

Group drumming led to increases in both affective and eudaimonic dimensions of wellbeing for mental health patients and carers, suggesting the potential of such initiatives for clinical contexts. Further research is needed to examine specific profiles of change for different mental health conditions.

Keywords

wellbeing; drumming; mental health; carers; mixed-methods

Acknowledgments

This research was carried out as part of “Creative Practice as Mutual Recovery,” a Connected Communities project funded by the Arts and Humanities Research Council (AH/K003364/1).

MAKING MUSIC FOR MENTAL HEALTH: THE BIOLOGICAL IMPACT OF LEARNING TO DRUM

Daisy Fancourt^{1,2}, Rosie Perkins^{1*}, Sara Ascenso¹, Louise Atkins¹, and Aaron Williamon¹

¹ Centre for Performance Science, Royal College of Music, UK

² Psychobiology Group, University College London, UK

* Correspondence: rosie.perkins@rcm.ac.uk

Background

Within biology, the field of psychoneuroimmunology explores how psychological processes can translate through the brain to impact on the immune system, and, in turn, feed back to alter our thoughts and feelings. Psychoneuroimmunology is particularly pertinent to mental health, as conditions from Schizophrenia to Alzheimer’s to bipolar disorder are now being recognized as psychological-biological disorders. For example, chronic immune system activation is being linked with depression, stress, fatigue, and loss of appetite. Research into the impact of music on immune function has burgeoned in the last decade, with over 60 studies from 22 countries exploring the effects of a variety of modes and genres of music on 37 different neurotransmitters, hormones, blood cells, and proteins. However, this is the first study to explore how cumulative musical learning can affect biological response.

Aims

The aims of this research were: (1) to assess the impact of a single group drumming lesson on biological response across nine contrasting biomarkers, and (2) to explore how several weeks of learning and performing drumming affects the immune system.

Method

The study consisted of two phases involving mental health patients and carers. Phase 1 was an experimental study of six weeks of group drumming involving 31 participants while Phase 2 was a controlled study of 10 weeks of group drumming involving 30 experimental participants and 15 control participants. In-depth saliva analyses of nine biomarkers were undertaken: the stress hormone cortisol and eight different pro- and anti-inflammatory “cytokines” (proteins that act as messengers between cells: IL2, IL4, IL6, IL10, MCP1, TNF α , TGF β , and IFN γ). Samples were taken before and after drumming sessions 1, 6, and 10 and analyzed using multiplex assays and repeated measures ANOVAs.

Results

Phase 1 demonstrated that, for patients and carers, a single group drumming lesson led to decreases in heart rate ($p=0.001$) and the stress hormone cortisol ($p=0.011$) and increases in immune activity across seven of the eight cytokines ($p=0.011-0.024$). However, over the whole six weeks, the four inflammatory cytokines significantly decreased ($p=0.027-0.038$; all p values correct for multiple comparisons). Phase 2 results confirmed this reduction in proinflammatory response for both groups alongside no change in control subjects.

Conclusions

Group drumming led to reduced stress hormone and increased immune activity across an individual session, and reduced pro-inflammatory responses across the entire intervention. This suggests that just one session of learning to drum can reduce stress levels and prevent inhibition of the immune system. If this occurs regularly over several weeks, it can lead to the reduction of inflammation which in turn reduces symptoms of depression, leading to increased wellbeing and greater social resilience. This is extremely promising evidence for the health benefits of learning to make music and emphasizes the mutuality of performance education for different participants. Further research is needed to assess the biological benefits of other music performance and education initiatives.

Keywords

music education; mental health; immunology; stress response; psychoneuroimmunology

Acknowledgments

This research was carried out as part of “Creative Practice as Mutual Recovery,” a Connected Communities project funded by the Arts and Humanities Research Council (AH/K003364/1).

MAKING MUSIC FOR MENTAL HEALTH: THE IMPACT OF FACILITATING COMMUNITY DRUM WORKSHOPS

Rosie Perkins^{1}, Sara Ascenso¹, Louise Atkins¹, Daisy Fancourt^{1,2}, and Aaron Williamon¹*

¹ Centre for Performance Science, Royal College of Music, UK

² Psychobiology Group, University College London, UK

* Correspondence: rosie.perkins@rcm.ac.uk

Background

Although a growing body of evidence supports the range of mental health benefits that accompany learning to make music in community settings, less is known of the potential benefits for the musicians who mediate such work. In a profession where musicians are expected to maintain the highest of performing standards, we know that physical and psychological distress are prevalent. This paper explores the notion that facilitating creative music performance in community settings may provide a forum for student and professional musicians to enhance their wellbeing and performance.

Aims

This research aimed to examine what it means to participate in a community group drumming workshop as musical facilitator, exploring the impact on psychological wellbeing and personal and musical development.

Method

Four musicians participated in a series of 6-week (Phase 1) and 10-week (Phase 2) drumming programmes open to mental health patients and their carers. Each programme consisted of weekly 90-minute group djembe drumming classes for up to 25 participants. One musician was a professional, employed to lead the sessions across Phases 1 and 2, and the remaining three were students from the Royal College of Music, paid a small bursary to act as assistants to the leader in one or both phases.

In order to understand the breadth and depth of the musicians' experiences, qualitative data were collected before, during, and after each program: (1) prior to commencement, individual semi-structured interviews were conducted focusing on general wellbeing and expectations of the program; (2) during each program, each musician completed a weekly written diary; (3) following the last session, individual semi-structured interviews were conducted focusing on general wellbeing and experiences of the program; and (4) during all sessions, participant and non-participant observations were conducted. Interviews, diaries, and observation notes were fully transcribed, and analyzed inductively for emergent themes using NVivo10.

Results

Three superordinate themes emerged from preliminary analysis: (1) the project as a step outside of the conservatoire "comfort zone," a source for learning and challenge, leading to the emergence of a new sense of self and a widening of musical identities; (2) enhanced psychological wellbeing, through increased meaning and sense of accomplishment, having at its core the realization of the rehabilitative power of music; and (3) development of professional skills, including broadening of social skills and the transferability of newfound skills to other contexts.

Conclusions

Facilitating group drumming workshops provided transformative experiences for the musicians in this study. While each musician experienced the programmes differently, they introduced challenges that appeared to enhance aspects of wellbeing and allowed for the emergence of new identities and skills. Taken together with the other papers in this symposium, the study provides support for the concept of "mutual recovery;" the notion that community creative practice can enhance wellbeing amongst all participants, including musician facilitators, through the creation of new and mutually supportive musical spaces. Further research is needed to investigate the potential for community music making to provide a space for wellbeing enhancement amongst musicians.

Keywords

mutual recovery; wellbeing; musicians; participatory music education; qualitative

Acknowledgments

This research was carried out as part of "Creative Practice as Mutual Recovery," a Connected Communities project funded by the Arts and Humanities Research Council (AH/K003364/1).

Thematic session Practicing for performance III

THE SCIENCE OF PRACTICE: SKILL ACQUISITION FROM A MUSICAL PERSPECTIVE

Terrell Hooper^{1*}

¹ Department of Music, Yongsan International School of Seoul, South Korea

* Correspondence: terrell.hooper@yisseoul.org

Background

In the area of music, skill acquisition is essential to the developing musician. Music skills, such as performing, creating, listening, and analyzing, require varying approaches and techniques to develop a level of expertise. When teaching music performance, the phrase "go practice" is too often used by music teachers around the globe. While practice is the necessary means to obtain expertise in most disciplines, skill development on a musical instrument is primarily an individual endeavor requiring a high level of self-regulation. Music teachers sometimes believe it is the responsi-

bility of the student to reckon with the complexities involved in music practice without help from the teacher. While the latter is true, teachers can provide useful instruction helping students confront the complexity of skill acquisition when musical expertise is a desired goal. Given the current viewpoint, an overview of music practice research can substantiate self-regulated learning theory as a framework for educators to help students develop individual practice skills necessary for successful performing.

Aims

The primary aim of the current research paper defines self-regulated learning theory within music practice and analyzes current research using self-regulation theory as a framework for research concerned with music practice skills. Additional topics discussed include practical guidelines for helping understand the science or theoretical phases observed in skill acquisition within music practice.

Main contribution

Self-regulated learning theory is only one way to examine the complex interactions involved in music practice; however, research involving instructional strategies for helping students become self-regulated learners is quoted by Gary McPherson and Barry Zimmerman as being almost non-existent. McPherson and Zimmerman give reason to believe that the dichotomy between music practice research and implementation of relevant models within the teaching of music performance skills is sparse and needs attention. The current paper discusses specific examples of research on instructional strategies pertaining to self-regulated learning. For example, empirical research, conducted by Peter Miksza, found positive results with instructional strategies improving students' self-regulation. Such research gives evidence for future research to be conducted in the "instructional" area of self-regulated learning theory. In other words, "how can teachers help students self-regulate?" The given overview of self-regulated learning theory provided with a synthesis of music practice research pertaining to self-regulation should illuminate further research in the area of practice instruction and more importantly, provide a workable framework for music teachers to help students self-regulate while practicing.

Implications

Expert music teachers should be aware of the complexities, whether personally, behaviorally, or environmentally, surrounding the development of music performance skills. The synthesis of research on self-regulated learning theory provides a useful framework for helping music and non-music educators guide students in becoming independent learners knowing how to self-regulate while developing expert performance skills.

Keywords

practice; skill acquisition; self-regulation; performing; education

THE EFFECTS OF SENSORY FEEDBACKS PRIVATION (AUDITORY, KINESTHETIC, AND VISUAL) DURING THE INITIAL APPROACH TO PIANO PIECES

Michele Rosita Montovani¹, Cristina Capparelli Gerling¹, and Regina Antunes Teixeira dos Santos^{1}*

¹ Graduate Music Program, Federal University of Rio Grande do Sul, Brazil

* Correspondence: regina.teixeira@ufrgs.br

Background

Music performance is one of the most demanding of human accomplishments that requires deliberate integration of multimodal sensory information in order to achieve higher levels of artistry. The integration of sensorial modalities (visual, aural, kinesthetic) is central for the development of mental representations in music, allowing the handling of musical conceptions based on performance feedback. The literature has reported empirical research involving the effect of impaired auditory feedback on the performance outcome and on the performance from memory.

Aims

The present research aimed at investigating the effects of sensory feedbacks privation (auditory, kinesthetic, and visual) during the initial approach to piano pieces by students belonging to different academic levels.

Method

The methodology was based on an experimental nested-design in which 12 pianists (freshman, sophomore and senior undergraduate students, and graduate students of Music) were given comparable excerpts of Haydn Minuets (20-24ms long) and were then submitted to four different practicing conditions with single and/or paired privation of feedbacks: (1) Condition A: Visual Decoding with kinesthetic feedback and auditory feedback privation; (2) Condition

B: Visual Decoding with privation of auditory and kinesthetic feedbacks (mental practice); (3) Condition C: Auditory Decoding with kinesthetic feedback and privation of visual feedback from the score (“playing by ear”); and (4) Condition D: Auditory Decoding with privation of kinesthetic and visual (score) feedbacks.

Results

Results have shown that in all four conditions the participants employed strategies for the manipulation of declarative/semantic knowledge for the reading of scores and for the understanding of the musical language, both in notated and auditory stimulated conditions. In three out of four conditions (A, B, and C), the participants manipulated strategies aiming at: (1) accessing procedural knowledge both at the instrument and removed from it in order to establish and/or coordinate performance procedures; and (2) enabling means of accessing and/or creating mental representations as performance guides as well as being able to sort out sensorial information.

Conclusions

Within the investigated sample the graduate students showed higher levels of expertise and more refined products as far as level of fluency under conditions A and B. Results changed significantly for conditions C and D. The absence of the written score combined with the lack visual feedback seems to have flattened out grade differentiation. Under conditions C and D participants, independent of academic rank, exhibited wide-ranging levels of acceptance and willingness to deal with novel modes of learning such as the specific conditions required for the experiment.

Keywords

deprivation of sensorial modalities; practicing conditions; sensorial feedbacks; mental representation; mental understanding

Acknowledgments

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PREDICTING COLLEGIATE WIND PLAYERS' PRACTICE EFFICIENCY, FLOW, AND SELF-EFFICACY FOR SELF-REGULATION: AN EXPLORATORY STUDY OF RELATIONSHIPS BETWEEN TEACHERS' INSTRUCTION AND STUDENT PRACTICING

Peter Miksza¹ and Leonard Tan²*

¹ Music Education, Indiana University Jacobs School of Music, USA

² Music Education, National Institute of Education, Nanyang Technological University, Singapore

* Correspondence: pmiksza@indiana.edu

Background

Musicians devote an immense amount of time towards individual, self-directed practice throughout their careers. Although musicians who have accumulated more practice time have generally outperformed others who practice less, researchers have shown that it has been the quality of one's practice that ultimately was the best indicator of achievement. Furthermore, researchers have also found that music students' practice effectiveness tends to be positively related to their self-beliefs regarding their musical competence and degree of commitment to music studies.

Aims

The purpose of this study was to examine whether students' reports of practice efficiency, flow during practicing, and self-efficacy for practicing self-regulation varied as a function of (1) tendencies towards self-evaluation, (2) knowledge of practice strategies, (3) tendencies to exhibit grit, (4) self-regulatory tendencies to be self-reflective when practicing, (5) their professors' methods of instruction in practicing, and (6) their professors' approach to delivering feedback. Qualitative descriptions of the practice approaches the students and their professors reported were also sought out.

Method

The volunteers for this study were 52 lesson professors and 241 of their students from 25 large, collegiate music programs in the USA. Data were collected via online questionnaires. The professor version included a section pertaining to background information and open-ended items regarding their methods of providing feedback to students, as well as how they would teach a student to practice when referring to a researcher-provided etude. The student version of the questionnaire included: (1) background information and practice habits; (2) open-ended responses based on

interpretations of the same etude their professor saw regarding self-evaluation tendencies and practice habits; and (3) measures of practice reflection, grit, flow, practice efficiency, and self-efficacy for self-regulation.

Results

Regression models were conducted for each of the outcomes (flow, practice efficiency, and self-efficacy for self-regulation) with the following set of predictor variables: status as graduate or undergraduate student, practice minutes per day, practice reflection, grit, ratings of students' practice strategy responses, and ratings of students' self-evaluation responses. Grit and practice reflection were found to be significant predictors in the final models for all outcomes ($p < 0.001$), whereas practice minutes per day was also a significant predictor of self-efficacy for self-regulation. No relationships found between the teachers' approaches to self-evaluation and practice instruction and any of their students' outcomes. The qualitative content analysis of the professor and student open-ended questionnaire responses pertaining to practice methods yielded five emergent categories of practice processes: *analysis prior to practicing*, *practice techniques to enact*, *positive habit forming*, *self-evaluation during and after practicing*, and *performing as a culminating activity*.

Conclusions

It is common knowledge that practicing is essential for achieving musical success and that developing musicians typically commit a great deal of time towards practicing. Overall, it appears that cultivating dispositions of grittiness and reflection would be particularly valuable when helping students be more efficient, achieve flow in their practicing, and be more confident as independent learners.

Keywords

practice; self-regulation; grit; flow; self-efficacy

Thematic session Movement and gesture I

FINGER FORCES IN CLARINET PLAYING

Alex Hofmann^{1,2*}

¹ Austrian Research Institute for Artificial Intelligence (OFAI), Austria

² Institute of Music Acoustics, University of Music and Performing Arts Vienna, Austria

* Correspondence: hofmann-alex@mdw.ac.at

Background

Clarinetists close or open multiple tone holes of the instrument to alternate the pitch during performance. Music teachers give advice to apply only minimal finger forces to the tone holes to maintain longer stamina and achieve better timing. Studies on other musical instruments reported mean finger forces ranging from 2.7 N on the violin (left hand clamping force to the finger board) up to 30-50 N on the guitar.

Aims

In this study, the finger forces applied to the six main tone holes of a Viennese clarinet were measured under controlled performance conditions, including different tempi, dynamics, and levels of expression.

Method

Clarinet students from the University of Music and Performing Arts Vienna ($n=17$) and professional clarinetists from Vienna ($n=6$) were invited to perform two tasks (expressive performance, technical exercise) on a sensor-equipped clarinet. This instrument measured the finger force of the index finger, the middle finger, and the ring finger of both hands, together with the tongue articulation at the reed. In the expressive performance task, the participants performed eight excerpts from the *Clarinet Concerto No. 1* by Carl Maria von Weber. In the technical exercise task, an isochronous 23-tone melody was performed, which focused on the coordination of tongue-articulation with the left-hand fingers. The melody had to be played in three tempo conditions in a synchronization-continuation paradigm.

Results

The participants showed larger mean finger forces during the expressive performance condition of the Clarinet Concerto ($M=1.21$ N) than for the technical exercise task ($M=0.64$ N). Although, the individual finger force profiles were overlapping, the group of professional players used even less mean finger force ($M=0.54$ N) in the technical exercise task than the students.

Conclusions

This study investigated finger force profiles of professional clarinetists and clarinet students. The overall results showed that clarinetists used smaller mean finger forces than reported for musicians performing on other musical instruments (e.g. violin and guitar). Furthermore, professional clarinetists were able to adjust their finger forces to very light fingering technique in the technical exercise task and achieved a higher temporal precision than the students.

Keywords

clarinet; performance; finger forces; motor action

Acknowledgments

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RECOGNIZING WHOLE-BODY ACTIONS: BINDING AND ATTENTION IN WORKING MEMORY FOR MOVEMENT

Catherine J. Stevens^{1}, Ashleigh Mills¹, Yvonne Leung¹, and Josephine Terry¹*

¹ MARCS Institute and School of Social Sciences and Psychology, University of Western Sydney, Australia

* Correspondence: kj.stevens@uws.edu.au

Background

Visual working memory (VWM) is central to learning and performing actions in dance, gymnastics, and martial arts. Tuition involves watching and reproducing actions performed by a teacher and coding, retaining, and retrieving actions from working memory. Relatively little is known about working memory for actions. Stimuli used in a handful of recent experiments are object-like and lack the fluidity of biological motion. There is also theoretical debate concerning binding versus independent storage of features in VWM and, if binding occurs, whether feature binding is “obligatory” or pre-attentive.

Aims

We investigated the effect of attention on binding action (e.g. running) and direction (e.g. left) features of human movement in VWM. A stringent test of binding was used consisting of a recognition task comparing intact and recombined test probes. Intact test probes were action-direction feature pairs exactly as they were presented in the study sequence; recombined test probes consisted of previously seen action-direction features presented in new combinations. Test Probe had four levels: intact, recombined, old action-new direction, and new action-old direction (within subjects). Participants were given either cued instructions (cue) or no attentional instruction (no cue). The dependent variables were accuracy and reaction time (RT). (1) If direction and action are integrated/bound in VWM then accuracy is greater and RT faster in recognizing intact probes compared with recombined test probes. (2) If feature integration/binding is obligatory then instruction to attend to either feature during retention does not affect the intact (over recombined) probe advantage.

Method

The sample comprised 40 adults without specialist movement training. Each of 60 randomized trials consisted of a study display of 3 x 3s action-direction items (e.g. run-right; walk-left; skip-right) followed by a 500ms retention interval and single test probe (e.g. run-left – recombined test probe). Study items and test probes were constructed from four actions and five directions. In the no cue condition, participants were instructed to press the key labeled YES if both the action and direction appeared in the study phase, otherwise press NO; in the cued attention condition, press YES if the cued feature (action or direction) appeared in the study phase, otherwise press NO.

Results

There was an intact advantage in accuracy (% correct; $F_{(1,38)}=13.25$, $p<0.001$, $d=0.65$), with recognition significantly greater for intact ($M=80.00$, $SD=18.45$) than recombined probes ($M=65.17$, $SD=26.45$). Probe type and attention interacted ($F_{(1,38)}=7.07$, $p<0.01$) with greater accuracy for intact ($M=76.00$, $SD=16.95$) than recombined probes ($M=50.33$, $SD=28.07$) but only in the no cue condition. There was a main effect of probe type on RT ($F_{(1,38)}=7.91$, $p<0.01$, $d=-0.33$), with intact probes ($M=1433.14$ ms, $SD=266.61$) eliciting significantly faster RT compared with recombined probes ($M=1535.94$, $SD=351.23$). An interaction between probe type and attention revealed significantly faster RT for intact ($M=1338.90$, $SD=274.29$) than recombined probes ($M=1539.32$, $SD=328.05$) but only in the cued condition.

Conclusions

Dynamic features action and direction appear integrated in VWM. From the perspective of performance education, cognitive load in learning actions increases as features increase. Benefits are likely in minimizing cognitive load for learners of dance and gymnastics by using materials where features are correlated, at least in the early stages of tuition.

Keywords

action; attention; binding; dance; working memory

AN EXPRESSIVE BODILY MOVEMENT REPERTOIRE FOR MARIMBA PERFORMANCE, REVEALED THROUGH OBSERVERS' LABAN EFFORT-SHAPE ANALYSES, AND ALLIED MUSICAL FEATURES: TWO CASE STUDIES

Mary C. Broughton^{1*} and Jane W. Davidson²

¹ School of Music, University of Queensland, Australia

² Melbourne Conservatorium of Music, University of Melbourne, Australia

* Correspondence: m.broughton@uq.edu.au

Background

Research shows that musicians' expressive bodily movements shape observer perception of performance. Propositions for the types of movements generated relate to the music structure, technical constraints, and expressive interpretation. However, scant research has investigated whether a core repertoire of expressive bodily movements for a particular instrument type exists, or documented relations to the music. In this paper we focus on marimba performance, and base our framework for identification on observer perception of expressive bodily movements in solo and collaborative contexts.

Aims

The study aims were twofold: (1) investigate the existence of a core repertoire of marimba performance bodily movements that is perceived by observers as expressive; and (2) identify key music-related features associated with the core repertoire.

Method

The investigation comprised two case studies, using Laban effort-shape analysis as the primary analytical framework. *Case study 1* examined data from a previously published inter-judge reliability study for Laban effort-shape analysis. In that study the participants were expert musicians: two percussionists and experienced marimba players (one female), a female violinist, and a male French horn player. Following training in Laban effort-shape analysis, the percussionists completed a verification task, the violinist an independent analysis task, and the hornist a signal-detection theory driven task. The material for analysis comprised sixteen 20-25s audio-visual excerpts of standard pieces of the solo marimba repertoire, performed by a female and male expert marimba player; eight, performed in a projected performance manner, are investigated here. Participants documented their analyses in pencil on the music score.

Case study 2 examined data from another previously published study involving an expert percussionist and experienced marimba player, and an expert classical vocalist, both female, as participants. Following training in Laban effort-shape analysis, the participants independently analyzed a marimba player's expressive bodily movements observed in a live recording of a marimba and flute duo. Participants used ELAN video annotation software to document their analyses.

Results

Analysis first involved pooling observations where all participants in the respective case study agreed on observing the same type of action at the same location in the performance material. This revealed a small repertoire of expressive bodily movements which were: allied to features of the score, such as accented notes dynamic markings, long-duration notes, rhythmic note groupings, and rests; technical elements related to movement around the instrument; and seemingly expressive of the performer's interpretation of the musical character. Certain expressive bodily movements marked the tempo in both solo and collaborative performance contexts. Examination of individual participant data revealed slightly more variety in the types and locations of actions observed, and individual preferences for observing particular types of expressive bodily movements.

Conclusions

A core repertoire of bodily movements produced in expressive marimba playing is perceived as expressive by observers. However, the expressive bodily movements produced and perceived may be shaped by individual music and motor expertise. Performance training involving deliberate development of an expressive movement plan for a music score, in light of observer perception of expressive bodily movements for the particular instrument, may enhance performer-audience communication.

Keywords

bodily movement; music performance; Laban effort-shape analysis; audio-visual perception; embodied cognition

Graduate award paper

BURNOUT AND ENGAGEMENT AMONG MUSIC PERFORMANCE STUDENTS: A QUANTITATIVE STUDY

Anna Zabuska^{1}, Jane Ginsborg¹, and David Wasley²*

¹ Centre for Music Performance Research, Royal Northern College of Music, UK

² Cardiff School of Sport, Cardiff Metropolitan University, UK

* Correspondence: anna.zabuska@student.rncm.ac.uk

Background

The physical and psychological demands of performing music may put the wellbeing of music students at risk. There has been a growing interest in the psychological wellbeing of music students and professionals; however, burnout and engagement, reflecting the attitude towards music-making, remain largely unexplored. In line with the sport and dance literature, Basic Psychological Need Theory (BPNT)—which seeks to explain the role of autonomy, competence, and relatedness in wellbeing—seems to be a useful framework to explore determinants of burnout and engagement in music. Since the traditions of music education vary across the world, there may be differences in wellbeing experienced by students in different countries.

Aims

The study aimed to establish and compare the levels of burnout and engagement in music students at conservatoires in Australia and the UK and to explore their potential determinants and consequences. In particular, the associations between the perceived social environment (i.e. autonomy and social support from the principal study tutor, social support and competition among students), need satisfaction (i.e. autonomy, competence, relatedness with regard to the tutor and with regard to other students), and burnout and engagement were studied. The relationships between burnout and engagement, and health issues, musculoskeletal pain, and practice strategies were also examined.

Method

A total of 146 undergraduate and postgraduate performance students at conservatoires in Australia and the UK responded to the quantitative questionnaire that combined several well-established psychological measures.

Results

Students in Australia and the UK experienced rather low burnout, while the levels of engagement were moderate to high. There were no differences between students in Australia and the UK in terms of global burnout and engage-

ment. Positive correlations emerged between perceptions of the social environment as being autonomous and socially supportive, and need satisfaction. Burnout correlated negatively and moderately with need satisfaction. The correlations between need satisfaction and engagement were positive and weak-to-moderate. Burnout and engagement turned out to be the most strongly associated with competence. The correlations between burnout, and health issues and musculoskeletal pain were positive and weak. No significant correlations were revealed between engagement, and health issues and musculoskeletal pain. Practice strategies correlated with engagement positively and weakly.

Conclusions

Highlighting the role of competence, and to a lesser extent, autonomy and relatedness in music-related wellbeing, this study shed some light on healthy careers in music. The results suggest that engaged students use a wider range of practice strategies, which could have an effect on their subsequent performance. Longitudinal research is needed to explore the temporal relationships between burnout and engagement, and need satisfaction, performance measures, and physical health in the context of music.

Keywords

BPNT; burnout; conservatoires; engagement; wellbeing

Thematic session Movement and gesture II

CHARACTERIZING GUQIN *ZOU SHOU YIN*: ANALYZING PHYSICAL GESTURE DATA OF A GUQIN PERFORMER TO CATEGORIZE SLIDING TONES TECHNIQUES

Jingyin He^{1*}, Ajay Kapur², and Dale A. Carnegie²

¹ New Zealand School of Music, Victoria University of Wellington, New Zealand

² School of Engineering and Computer Science, Victoria University of Wellington, New Zealand

* Correspondence: jon.he@vuw.ac.nz

Background

The Guqin is a Chinese fretless plucked seven-stringed instrument with a history of about 3000 years. The instrument's modulation techniques, known as *zou shou yin*, are known to define the distinct characteristics of the instrument: the fluid modulation of pitch, and the dynamics and timbre in the tones created by the combination of the left and right hand finger techniques. While the right hand plucks the string, most of the stylistic information of the tones is produced by the left hand gestures, which are often complex techniques that require many years to master. *Zou shou yin* consists of four major categories of left hand sliding techniques: *yin*, *nao*, *chuo*, and *zhu*. Each technique has a basic form with a subset of variations based upon it falling under the basic technique as a category, mastered by all Guqin performers. As the overall population of Guqin performers is meager for the instrument, coming by a master player can be quite a rigorous task. By measuring the physical dynamics of master Guqin performers, we will be able to gain insights into how master performers produce each technique to achieve stylistically individualized performances.

Aims

The aim of this research was to successfully implement the first ever attempt of capturing, segmenting, and categorizing the physical gesture data of a master Guqin performer. By analyzing this data, we attempted to both document and materialize the data provided for future use.

Method

The methodology of data collection was based on the player's action-oriented ontology of the instrument. In this study, we utilized a minimally obstructive custom-built data glove (sample frequency=100 Hz) to measure the posture (MCP flexion/extension of all fingers except pinky, wrist deviation, wrist flexion/extension, and wrist pronation/supination) and physical dynamics (acceleration profile) of the performer's left hand. As the instrument is typically placed on the table, the system utilizes the table's length (x-axis) and width (y-axis), and earth's gravity (z-

axis) as reference points to define the frame of reference. Data were transmitted wirelessly to a laptop running custom software that recorded audio and physical gesture data synchronously at independent sampling rates.

The performer's task was to provide five samples for each of the four basic techniques (total 20 executions) in the context of an excerpt from the traditional repertoire. Before each execution, one count-in measure of two minim beats at 60 BPM was provided as tempo reference. To remove order effects, the sequence of order to play the four basic techniques was randomized.

Results

Preliminary analysis of the data collected showed that all the four basic techniques were performed with stable flexion in the MCP joints of the fingers, wrist extension, and wrist supination. The *chuo* and *zhu* techniques were distinguishable by the direction of gradient (*jerk*) between the local maxima and minima of linear acceleration data (x-axis) during the gesture. The steepness of the gradient provided an indication for the force of the slide. The linear acceleration plot (all axis) of *yin* and *nao* techniques showed regularity in the peak amplitude and distance between peaks of acceleration. While the linear acceleration profile of *yin* resembled a ridge of a sinusoidal function, the profile of *nao* resembled a Dirac comb function.

Conclusions

By collecting, analyzing, and visualizing the master performer's physical gesture data, software tools can be designed to aid pedagogy and enhance performance. The insight gained from this study can also be used for automatic transcription of Guqin performance.

Keywords

Guqin; performance technique study; physical gesture data; physical dynamics measurement; hand gesture analysis

PIANO PERFORMANCE: MUSIC, MOVEMENT, CREATIVITY, AND THE AFFECTIVE EXPERIENCE

Barbara James^{1*}

¹ School of Human Movement and Nutrition Sciences, University of Queensland, Australia

* Correspondence: barbara.james.phd@gmail.com

Background

Music and movement share a dynamic relationship, nowhere more evident than in a piano performance. The pianist's creative imagination is a key driver giving the music its emotional appeal and unique identity by shaping its sounds and expressive gestures. The physical and creative pleasure in performing influences a performer's affective experience, intensifying creativity and communication quality. Moved by the pianist's total involvement, observers share the affective response, influencing their aesthetic appreciation. Movement is central to performance, playing many roles affecting musical communication, and with its visual kinaesthetic cues pivotal to augmenting the impact of the soundscape.

Aims

In this presentation I will explore: (1) the bi-directional associations affecting the relationships among music, movement, and creativity; (2) the visual aspects of music in communicating the affective experience with the audience; and (3) the movement characteristics involved in generating an artistic and original musical rendition.

Main contribution

A performance evolves through a pianist's creative imagination, decoding the musical structures and conveying them expressively through a flexible and innovative interpretation. Creativity involves continuous interaction with the music: pianists listen to the sounds, evaluating their quality, intensity, and fit with the dramatic concept as a whole. Embedded in the playing actions are expressive movements of the trunk, head, and arms/hands which communicate the music's structural and emotional features, and increase in amplitude and duration with the pianist's growing skill level and artistic inspiration. The visual information transmitted in these movement cues impacts significantly on the listeners' affective interpretation of the music, influencing their perception of the pianist's musicality and skill level.

Musically-driven movement constitutes a source of affective pleasure for performers engaging their creative power and influencing aesthetic judgments through sensory information from neural receptors (*proprioceptors*) in musculoskeletal tissues, which in combination with *audition* and *touch* also refine sound quality. In addition, the performer's physical connection with the music activates the mirror neuron system in both the pianist and audience enabling

a sharing of the affective experience, and observers to empathize emotionally with the meanings portrayed in the movements and thus engaging them in communication to provide the critical performer-audience link.

Performance quality is reliant on its movement base to generate fluent playing while allowing spontaneous adjustments to a shifting music environment. The upper body should be without tension, so a movement, when initiated, blends fluently into the next. The arm operates functionally as a “kinetic chain” producing the keystroke through sequential wave motion with its follow-through trajectory communicating expressive elements in the music, further highlighted by uninhibited trunk surging and swaying. The pianist’s sitting position is crucial in allowing flexible arm-trunk movement while providing a stable support base for dynamic postural changes.

Implications

Although music performance relies on dynamic postures, movement, and creative sensibility to convey the score’s musical ideas, these elements have not always received sufficient attention from music trainers. However, students deserve to understand the role of visual movement cues in association with the auditory in moulding a rich musical experience, and the affective power of music-driven movement in producing an aesthetic response involving both performer and audience.

Keywords

creative thinking; music communication; affective experience; piano-related movement; music perception

Workshops

BEETHOVEN’S *GROSSE FUGE* IN ITS VARIOUS MANIFESTATIONS: A PERFORMER’S APPROACH

Julian Jacobson^{1*}

¹ Royal College of Music, UK

* Correspondence: julianjacobson19@yahoo.co.uk

Background

Beethoven’s *Grosse Fuge*, the mightiest fugue ever composed and one of the high points of Western music, has never become a comfortable experience, either for performers or listeners. Stravinsky said of it: “It is an absolutely contemporary piece of music that will be contemporary forever.” Beethoven himself foresaw the problems when he removed it from its original position as the finale of the Op. 130 string quartet, substituted a lighter finale, and published the *Grosse Fuge* separately. At this point he also arranged it for piano duet, being dissatisfied with an earlier arrangement by Anton Halm, and published it as his Op. 134. Beethoven’s original manuscript of this version was rediscovered in 2005 and is available to view online in the Juilliard School of Music’s manuscript collection. There are subtle differences between the original quartet version and this piano duet version, showing that Beethoven continued to live with his material and explore its possibilities. The work is also sometimes played by full string orchestra, adding further insights.

Aims

This workshop will explore the differences between the different versions and in particular aim to show how Beethoven reconceived his material for the very different medium of piano four hands.

Content

The opening part will consist of a thorough examination and analysis of the score. Notational aspects will be covered as these are causes of frequent questioning and controversy, such as the tied pairs of quavers seen in both the string quartet and piano duet versions. There will then be an exploration of Beethoven’s duet arrangement, the textual changes from the original quartet version with an attempt to explain the reason for these, and a comparison of Beethoven’s arrangement with the one by Hugo Ulrich in the standard published arrangement, which is in fact closer to the original than Beethoven’s own transcription. This will lead to a performance of the piano duet version.

Main contribution

As a Beethoven performer of long and extensive experience, having given many complete cycles of the Beethoven solo, violin, and cello sonatas, and now as Chairman of the Beethoven Piano Society of Europe, I believe I can bring a wealth of knowledge and involvement to this project.

Keywords

Beethoven; *Grosse Fuge*; analysis; comparison; performance

MUSIC PERFORMANCE TEACHES CONCEPTS AND SKILLS IN STEM EDUCATION

Dylan Savage^{1*} and *Mirsad Hadzikadic*^{2*}

¹ Department of Music, University of North Carolina–Charlotte, USA

² College of Computer Science, University of North Carolina–Charlotte, USA

* Correspondence: dsavage@uncc.edu; mirsad@uncc.edu

Background

Dylan Savage, DM, is a Bösendorfer Concert Artist, a Capstone Records Recording Artist, and an Associate Professor of Piano. He is co-author of *A Symposium for Pianists and Teachers: Strategies to Develop the Mind and Body for Optimal Performance*. Savage is the creator of *What's Music Got to Do With It?*: a consulting business that uses music performance to define, illustrate, and clarify concepts and skills in other disciplines. Clients have included Fortune 100/500 businesses and universities.

Mirsad Hadzikadic, Ph.D., has over thirty years of information technology experience combining business and academic environments. His research/scholarship activities have been primarily focused on data mining, cognitive science, medical informatics, and complex adaptive systems. Mirsad serves as the Founding Director of the Complex Systems Institute at UNC Charlotte, Faculty Director of the Health Informatics Professional Science Masters Program, and Director of the Data Science and Business Analytics Professional Science Masters Program. His current research interests include critical aspects of creativity/innovation, foundational aspects of the complexity theory, and the systems view of policies in financial services, economics, defense, healthcare, and political science.

Aims

This workshop aims to expand the parameters of performance science to include how music performance can be used to successfully demonstrate and teach concepts and skills in non-music areas. Our goal is to demonstrate a new area of performance science which we have developed and utilized in a number of classes at the University of North Carolina-Charlotte. We believe there is considerable potential for this new application in both K-12 and undergraduate education.

Content

The workshop will comprise examples of how the presenters use live music to teach concepts and process in critical need areas in STEM disciplines. They will show how concepts and definitions for collaboration, authenticity, creativity, innovation, complexity, and emergence can be explained and demonstrated effectively using live performance. Audience interaction will be strongly encouraged. Savage and Hadzikadic will describe how they have applied these approaches in their eScience classes at the University of North Carolina–Charlotte and in demonstrations elsewhere. They will be assisted by oboist Susan Savage, Performer-in-Residence, University of North Carolina–Charlotte.

Main contribution

The presenters will show how music performance can be used to teach concepts and skills in non-music areas.

Keywords

performance; interdisciplinary; learning; concept delivery

RELATING PRACTICES IN BODY EXPRESSION WORK WITH SINGERS: DELSARTE, DALCROZE, GROTOWSKI, OIDA, CHI KUNG

Deborah Moraes Gonçalves de Oliveira^{1,2*}

¹ Music and Visual Arts, Federal University of Piauí, Brazil

² Communication and Arts, Aveiro University, Portugal

* Correspondence: deboraholiveira@ua.pt

Background

As a voice teacher who has, since 1998, taught high-school students in the USA and undergraduate students in Brazil, I have always been concerned with how to help students in the development of their body expression. During my research of the literature on body and music, I found that there was a gap in what concerned the expressive development of singers for live solo performances. I have developed and tried some body-voice-movement exercises with my own students only to realize later that some of the most important names in the theater and dance fields had already thought of and implemented similar practices. After more reading and practice, I developed a series of exercises from the fields of theater and dance that I felt would be useful to singers, if applied by another singer. I have put these exercises together in a Body Expression workshop for singers and have travelled through the main Federal Universities in northeast Brazil, administering these courses to undergraduate- and graduate-level voice students, with very encouraging results.

Aims

In work with singers, usually, specialists in theatre, dance, and somatic therapy are called up for help with their body expression. These specialists work each from their own experience in their specific field, and not always from a musician's perspective. The problem is that the singers are not always able to apply the work done with those specialists to their actual singing activity. The present workshop aims to offer singers a mix of exercises that, together, may help them develop their body expression for their specific activity.

Content

The workshop will comprise exercises based on Dalcroze, Delsarte, Grotowski, Oida, and Chi Kung principals, including the following topics: body muscular perception, breathing perception, rhythm perception, opening of the channels of perception (ears, eyes, touch, smell), space and people awareness, and personal energy development.

Main contribution

This workshop aims to help singers with perception of the self, in their search for positive results in solo vocal performance practice.

Keywords

expression; embodiment; singing; gesture; concentration

Acknowledgments

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BODY SENSE: BREATHING EXERCISES

Kaarina Ollila^{1}*

¹ Department of Church and Organ Music, Sibelius Academy, Finland

* Correspondence: ollila_kaarina@hotmail.com

Background

The body is the instrument of the singer. Thus, it is essential for singers to know and understand how their own instrument works and to be able to feel natural breathing and airflow. With proper breathing technique a singer can prepare for the performance both mentally and physically. This is crucial when conveying the music to the audience.

This workshop is based on the experience from various breathing exercises that I have developed and used in both teaching and performing. Some of the exercises I have developed independently, some I learned from my teachers, and some are influenced by ideas from yoga and stretching technique, where breathing is an important part of the physical exercise.

During the last five years I have given several lectures and workshops through “vocalizing and body sensing exercises in learning and teaching music” at the Sibelius Academy, Kuopio. The courses have received positive feedback because of the combination of physical and physiological facets and the variety of different exercises.

Aims

This workshop aims first for participants to feel free airflow and natural breathing and to sense how natural deep breathing is expanded to expressional breathing. Second, it aims for participants to understand the dialog between resonance and breathing and to understand the dialog between relaxation and concentration. Finally, it aims for participants to be able to understand the connection between concentration and the vigorous act of singing without unhealthy muscular tension.

Content

The workshop will start with a short speech on the basic rules of the physiology of voice production and the importance of a good posture in singing. It will continue with a workshop of breathing exercises with which participants may feel free air flow, develop kinesthetic sense, improve body balance, and learn tools to work with the sensitive instrument using the techniques that have been most successful based on my experience from earlier courses.

Main contribution

This workshop will focus primarily on vocalizing, breathing technique, and relaxation.

Keywords

dialog; breathing; relaxation; concentration; expression

ENHANCING MUSICAL PERFORMANCE WITH THE FELDENKRAIS METHOD®

Stephen A. Paparo^{1}*

¹ Department of Music and Dance, University of Massachusetts–Amherst, USA

* Correspondence: spaparo@umass.edu

Background

In western culture, mind/body dualism has led to the neglect of the body in music making. Music performance, by its very nature, is an embodied human practice that relies on the integrated processes of thinking, feeling, sensing, and acting. For more than a decade, education researchers and arts educators have recognized the importance of embodiment and its implications for research, teaching, and learning. Bresler posited that embodiment offers a compelling lens through which to re-conceptualize learning and teaching. She asserted that forms of bodily instruction (known as Somatic or Somatic Education), which have existed outside of mainstream education, contain valuable knowledge and may provide a pedagogical means through which embodied knowledge may be explored in educational settings. Somatic practices, such as the Feldenkrais Method, acknowledge phenomenological embodiment, and provide sources for body-based pedagogy that have been incorporated in music instruction.

Aims

The Feldenkrais Method, named after its originator Moshe Feldenkrais (1904-1984), is a form of somatic education that develops greater awareness of one's own function. Feldenkrais embraced phenomenological embodiment, maintaining that moving, perceiving, acting, feeling, sensing, and thinking are inseparable. To embody, from a Feldenkrais perspective, is to become more aware of and use oneself more optimally than the extent to which one is habituated; a goal of the Feldenkrais Method, therefore, is to become more integrated and more fully embodied.

Content

The first part of the workshop will provide an overview of the Feldenkrais Method, including Dr Feldenkrais' theories of human development, and offer attendees an opportunity to experience an Awareness Through Movement® lesson, a verbally-directed sequence of movements taught in groups. The second part will explain how specific strategies (i.e. moving with attention, differentiation, etc.) help students more fully embody their musical performance.

Main contribution

The purpose of this workshop is to demonstrate how integrating strategies of the Feldenkrais Method can enhance music instruction. Taking part in an Awareness Through Movement® lesson will provide an experiential understanding that the development of one's awareness can free an individual from habitual movement patterns and lead to the possibility of more dynamic function to improve musical performance.

Keywords

embodiment; Feldenkrais Method; instrumental instruction; singing instruction; somatic education

Friday
04 September 2015

Thematic session

Musical development

DOES REFLEXIVE INTERACTION ENHANCE CHILDREN'S MUSICAL IMPROVISATION? CHILD-COMPUTER INTERACTION AT THE BEGINNING STAGE OF MUSIC LEARNING

Anna Rita Addressi^{*}, Filomena Anelliⁱ, Diber Benghiⁱ, and Anders Friberg²

¹ Department of Education Studies, University of Bologna, Italy

² Department of Speech, Music and Hearing, KTH Royal Institute of Technology, Sweden

* Correspondence: annarita.addressi@unibo.it

Background

Several scholars tackled the issue of children's musical improvisation from different learning/teaching perspectives and by using different methodologies. We investigated this issue through the reflexive interaction paradigm. This paradigm is based on the idea of letting users manipulate virtual copies of themselves through specific software called Interactive Reflexive Musical Systems (IRMS).

Aims

We investigated whether the reflexive interaction using the IRMS influenced the children's improvisation skills at the beginning stage of musical learning. We used a particular IRMS, the MIROR-Impro, implemented in the MIROR project (European Commission-FP7), which is able to reply to the child playing a keyboard by mirroring (with repetitions and variations) their inputs.

Method

The study was conducted in a primary public school with 47 children, aged 6 to 7. The experimental design used the convergence procedure, based on three sample groups (one control group: CG, and two experimental groups: EG1 and EG2), allowing us to verify if the MIROR-Impro and the reflexive interaction are necessary and sufficient to improve the children's abilities to improvise, in solo and in duet. Independent variables: to play (1) only the keyboard, (2) the keyboard with the MIROR-Impro but with a not-reflexive reply, (3) the keyboard with the MIROR-Impro with a reflexive reply. Dependent variables: children's ability to improvise (1) in solo, and (2) in duet. Procedure: each child carried out five weekly individual 12-minute sessions. The CG played the complete package of independent variables (v1+v2+v3); EG1 played the keyboard and the keyboard with the MIROR-Impro with the not-reflexive reply (v1+v2); EG2 played only the keyboard with the reflexive system (v3). One week after, the children were asked to (1) improvise a musical piece on the keyboard (*Solo* task) and (2) play the keyboard like in a dialogue, as a pair with a friend (*Duet* task). Activities and tests were video recorded.

Results

Three independent judges assessed the Solo task improvisations by means of a grid based on the TAI (Test for Ability to Improvise, by Gary McPherson) rating scale. The following assessment criteria were used: Instrumental Fluency, Musical Organization, Creativity, and Musical Quality. Final results showed that the CG (13.56) obtained a lower score compared to both the EG1 (13.82) and EG2 (15.45). Therefore, the total trend revealed that the IRMS and the reflexive interaction were not necessary but sufficient to improve children's ability to improvise. However, the differences were not statistically significant (ANOVA $p=0.35$). The analyses on each criterion confirmed the overall trend, in particular as far as the Musical Organization was concerned (CG=3.13; EG1=3.38; EG2=4; $p=0.08$). Moreover, EG2, which played just with the reflexive system, showed a higher score in all criteria.

Conclusions

The analyses of the *Duet* tasks are currently ongoing through an original grid for assessing the musical dialogue improvisation. This discussion will focus on: (1) the efficacy of reflexive pedagogy in the field of children's music performance and technology-enhanced learning; (2) the analysis and assessment of the children's ability to improvise; and (3) musical improvisation in computer-child interaction.

Keywords

reflexive interaction; improvisation; children's music education; assessment; computer-child interaction

Acknowledgments

This work was partially supported by the EU-ICT Project MIROR (Musical Interaction Relying On Reflexion, www.mirrorproject.eu).

ALL IN A DAY'S WORK: THE EFFECT OF PREPARATION AND PERFORMANCE ON MIDDLE-SCHOOL HONOR CHOIR PARTICIPANTS' ATTITUDES TOWARD THEIR LITERATURE

*Andrew H. Homburg¹**

¹ Department of Music, Missouri State University, USA

* Correspondence: andrewhomburg@missouristate.edu

Background

The cooperative choral festival is a common experience for many students involved in choral music in the United States. Honor choir, all-state, and league festivals usually fit under this cooperative choral experience heading. Common elements of the experience include an attendee selection process, distribution and preparation of materials on an individual or group basis, travel to a festival location to prepare with a clinician for one or more days, and a public performance at the end of festival. Although many choral students and their teachers seek these experiences, little research exists on the effect of these experiences on those who attend.

Aims

The purpose of this study was to gain insight into possible changes in beliefs held by middle school students about the music performed during a one-day honor choir festival day.

Method

70 middle school honor choir participants answered questions about each piece of literature's difficulty, the difficulty of their voice-part in each piece, and their enjoyment of singing each piece via a 15-item paper survey. Participants gave their responses before the first rehearsal on the day of the honor choir festival, during two of the day's breaks, and after the evening's concert. Participants' responses were analyzed using a one-way analysis of variance (ANOVA) to test for any significant change across trials ($p < 0.05$).

Results

Analysis revealed significant change on seven of 15 items. Post hoc analysis revealed participants responded differently between trial 1 (pre-test) and trial 4 (post-concert) on seven items, and between trial 1 (pre-test) and trial 3 (afternoon break) on four items. Participants reported a significant increase in disagreement with the statements about the piece of literature or their voice part being difficult on four of their five pieces of literature. Participants reported an increase in their enjoyment of singing each piece of literature, but only reported significantly so on one piece.

Conclusions

As one might expect, honor choir performers in this study reported an increase in their abilities to perform each piece of literature. Furthermore, they reported increased enjoyment on each piece of literature, significantly so on one piece. It would seem honor choir, in this case and perhaps in others, has a positive effect on participants' perception of ability and enjoyment of music. More research into the effect of performance preparation is warranted.

Keywords

music performance; music instruction; music education; middle school; choir

Acknowledgments

Missouri State University, specifically the College of Arts and Letters Dean Gloria Galanes, Music Department Head Julie Combs, and members of the International Travel Awards Committee are acknowledged for their ongoing support of my endeavors.

DELIBERATE PRACTICE OF HIGH SCHOOL INSTRUMENTALISTS

*Peter J. Hamlin¹**

¹ Department of Music, Gonzaga University, USA

* Correspondence: hamlin@gonzaga.edu

Background

Creating and fostering a climate in which students have regular, meaningful individual practice sessions is a big challenge for teachers. Students must be taught how to develop the necessary time management skills and effective practice strategies to reinforce the likelihood and quality of student practice. However, many teachers and students may not be communicating adequately about how to optimize practice to make it more efficient and enjoyable. As recently as a decade ago, studies on practice noted the absence of theoretical frameworks to guide researchers and resulting variations in operational definitions of effective practice from study to study.

Aims

The purpose of this study was to develop a better understanding of the variables and their relationships that impact the deliberate practice of high school instrumental music students.

Method

Woodwind, brass, and percussion players in grades 9-12 enrolled in instrumental music classes in the States of Florida and Washington were invited to participate in the study. The measure used was a survey designed to elicit a response to variables impacting deliberate practice which included parental involvement, teacher characteristics, motivation, self-efficacy, goal-setting, concentration, metacognitive skills, and practice commitment.

Results

An exploratory factor analysis was conducted using the responses from the instrumental practice survey. Descriptive statistics and correlations will be presented and discussed. The factors that were extracted were also placed into a model and tested to further understand their relationships. Self-efficacy, intrinsic motivation, and establishing goals were all shown to highly impact students' commitment to practice.

Conclusions

It is important that an environment be established that supports deliberate practice, that effective practice strategies are taught and used, and that students work to create metacognitive and self-reflective behaviors that allow them to develop greater autonomy over their own learning. All students would benefit from specific instruction in how to establish an effective practice environment and how to use a repertoire of techniques and strategies in contextually relevant situations.

Teachers need to provide sufficient positive feedback to build the student's self-perception, which in turn may make practicing more fun. Musicians who have a strong, positive self-belief are likely to be more motivated to persist in developing performance skills. Students must be provided with opportunities where they can be successful and in which they can develop the confidence to continue developing skills in deliberate practice.

Keywords

deliberate practice; music performance; music education; motivation; practice commitment

Thematic session Evaluating performance I

TO READ OR NOT TO READ: AUDIENCES' PERCEPTION OF MEMORIZED AND NON-MEMORIZED PIANO PERFORMANCES

*Lei Na Lu*¹*

¹ Sydney Conservatorium of Music, University of Sydney, Australia

* Correspondence: lelu0510@uni.sydney.edu.au

Background

Performing with and without a musical score is a part of performance culture which has been dictated by both the audience and performer. Prior to the 19th century, performers were expected to perform with the score and playing from memory implied the performer was improvising or the music was not considered a serious composition. When

Clara Schumann and Franz Liszt gave performances from memory, the sensationalism of their virtuosic displays started a trend in performance culture and changed the expectations of audiences.

Music performances are perceived by audiences through sight and sound. Audience evaluations of performances are strongly influenced by the performer's gender, facial expressions, and intensity of body movement. Audiences rate performers exhibiting increased body movement and heightened facial expressions as being more expressive or dramatic. When audiences are presented with the same audio file but with videos of different performers, they still perceive differences in performance quality and expression.

Current performance etiquette expects musicians to give performances from memory. When a performer seems to be reading from the score, would the audience evaluate the performance differently than if the performer was playing from memory?

Aims

The aim of the study was to investigate how audiences evaluate pianists performing with and without the music score.

Method

Stimuli. Four tertiary performance major pianists were recorded performing Schumann's *Intermezzo Op. 8, No. 6*. Two pianists performed using the score and two pianists performed from memory. The pianist's recordings were edited into short audio-only, video-only, and audio-video clips using WaveShop audio editing software and Windows Movie Maker video editing software.

Task. The task given to participants investigated how they would evaluate pianists performing with and without the score. 20 participants listened to audio-only clips where they could hear but not see the pianists. They watched video-only clips in which they could see but not hear the performers. Participants also observed audio-video clips in which they could both hear and see the performer playing with or without the music score. Participants rated each clip for technical proficiency, expressiveness, and overall performance quality on a scale of 1-10. The audio-only and audio-video clips were shown in a randomized order.

Results

Preliminary results showed that audiences gave more consistent ratings on clips where they could see and hear the performers. Performances with score and from memory both had mixed positive ratings. Results will be discussed in further detail to reveal how audiences responded to only hearing and then seeing performers playing with and without the music score.

Conclusions

Memorization is a time consuming yet rigid fixture of most music performances. If musicians and audiences can better understand the influence memorization has on performance evaluation, then performers may be able to better engage with audiences and communicate more effectively through their performances.

Keywords

memorization; performance; perception; audiovisual; non-verbal communication

EFFECTS OF TEMPORAL CONGRUENCE ON EVALUATIONS OF CONDUCTOR EFFICACY

Cory Meals^{1*}, *Steven Morrison*¹, and *Deborah Confredo*²

¹ Laboratory for Music Cognition, Culture, and Learning, University of Washington, USA

² Boyer College of Music and Dance, Temple University, USA

* Correspondence: cdmeals@uw.edu

Background

Instrumental ensemble conductors are seen as both interpreters of musical information and coordinators of musical activity. The qualities of their gestural contributions have been shown to influence observer evaluations of ensemble performance, but less empirical work exists exploring the influence of temporal action/sound congruence in this setting.

Aims

The primary objective of this study was to investigate the role of action/sound congruence in observer evaluations of conductor efficacy where domain specific temporal distance has been experimentally manipulated.

Method

We collected video from five conductors, from which we extracted two excerpts per conductor (fast, slow). These excerpts were manipulated using video editing software to create stimuli for each excerpt encompassing no offset, audio-lead, and video-lead conditions of $\pm 15\%$ and $\pm 30\%$ of performed tempo. Stimuli were ordered so that no two conductors or conditions (audio/visual offset or fast/slow excerpt) were seen consecutively. For each excerpt participants ($N=35$) evaluated the conductor, the ensemble, and overall performance.

Results

In a preliminary data collection we compared participant ratings using two within-subjects repeated measures ANOVA in which means of the five conducting evaluations and five ensemble evaluations were used as dependent variables. There was a significant main effect for evaluations of conducting tasks ($F_{4,31}=16.61$, $p<0.001$) with a moderate main effect (partial $\eta^2=0.68$). Evaluations of the -30% (audio-lead) condition were significantly ($p<0.01$) lower than all other conditions.

Conclusions

Preliminarily, results suggested that the placement of gesture behind its sonic correlate played a detrimental role in observer evaluations of conductor efficacy. Conversely, evaluations were not affected by an equivalent offset of gesture ahead of sound. These results lend support to the predictive or delineative function of movement in music performance and, in turn, support certain schools of conducting practice. Given the prominent role of conducting in ensemble-based musical traditions, these findings offer meaningful implications for practitioners and performers alike.

Keywords

conducting; audio-visual interaction; musical gesture; action-sound congruence; performance evaluation

AUDITIONING THE AUDITION: MUSIC PERFORMERS AS EXPERT LISTENERS

*Helen F. Mitchell**

¹ Sydney Conservatorium of Music, University of Sydney, Australia

* Correspondence: helen.mitchell@sydney.edu.au

Background

Conservatorium music students learn traditional performance skills for the music profession, but do not learn to think critically about sound evaluation for auditions, competitions, and examinations. Recent empirical evidence suggests that music assessors are not as well prepared to assess sound as they imagine, have limited vocabulary to describe what they hear, and are influenced by visual and extra-musical aspects of performances. This has profound implications for future generations of musicians who are required to be expert listeners. There is a growing need to prepare tertiary level performers to think creatively, beyond the craft of performers, to be critical thinkers about musical “sound.”

Aims

The aim of this study was to examine music students’ experiences of music performance evaluation in a live mock audition, and with a variety of audiovisual presentations, with and without sound.

Method

Conservatorium performers were invited to act as auditioner and auditionee in a mock-audition. Auditioners experienced live-performances where the auditionees ($n=6$) were visible to the panel, and behind a screen, as if at a blind audition. The student panel were invited to evaluate performances, and make any notes they deemed necessary to help discuss them after the performances. They formed a panel to discuss performances, as would take place following performances at music auditions or competitions.

Performances were audio and video recorded, and arranged into three presentation conditions, Audio-only, Visual-only, and Audio-visual, each prepared in randomized order. In a second session, all students from the live-audition

reviewed the original six performances in each presentation (A, V, AV) and were invited to select their top three performers. They also formed a panel to discuss performances.

Results

Results of the panel discussions and written evaluations will be discussed with reference to recent perceptual and cognitive research on music reception and add to the existing body of knowledge on music assessment. More formal listening training will prepare tertiary music students to think beyond the craft of music performance, and to create and demand more robust creative assessments. It will (1) develop music students' awareness of sound in performance, (2) equip them with skills to assess and articulate the sound of performers in discussion with other musicians, and (3) enable them to explain and rationalize their performance evaluations.

Conclusions

This study is the first to challenge students' listening acuity for performance and performer evaluation by harnessing knowledge from recent empirical testing to a real-world setting. It will enhance music students' critical listening skills for performance evaluation, and has the potential to redefine the way in which the music profession critically evaluates performers.

Keywords

music performance; music perception; auditions; evaluation; audiovisual integration

Acknowledgments

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Thematic session Methods in performance education

HOW TO IMPROVE AWARENESS OF THE VIOLINIST'S LEFT HAND THROUGH SFILIO'S METHOD

Ludovico Tramma^{1*}, *David Wyn Lloyd*¹, *Ana Torres*², and *Fiammetta Facchini*³

¹ Department of Communication and Art, Aveiro University, Portugal

² Department of Education, Aveiro University, Portugal

³ Conservatory of Music Cagliari, Italy

* Correspondence: ludovico_tramma@hotmail.com

Background

One of the most frequent physical problems in violinists/violists is represented by an excess of pressure of the left hand fingers on the fingerboard. Excessive rigidity of the left hand can cause lethargy of movement of the fingers and interferes with free changes of hand position. A literature review of Violin Methods—Geminiani, Campagnoli, Ferrara, Curci, Buya, U.V.I (*Unione Violinisti Italiani*), Kreutzer, Baillot, Rode, Alard, De Bériot, Laoureux, Flesch, Galamian—showed a shortage of specific exercises to improve awareness of the left-hand fingers in terms of contraction and relaxation. Among all the Methods examined was one founded, by Francesco Sfilio—Italian violinist and teacher of the nineteenth century—in which it is proposed to implement *esercizi muti* (silent exercises-without the bow).

Aims

The objective of this study has been to verify if the application of Sfilio's Method can lead to an effective reduction of left hand tension with regard to the prevention of musculoskeletal diseases. I.e. through the structural application of this Method, the validity of some exercises were tested in order to understand and to verify if, applying them daily, it might help violinists to optimize performance.

Method

Three measurements were taken with a sensor and three video recording realized in a two-week period by seven students of the High Conservatory of Music, where the principal author was the Professor. The device, created specifically for this study by the author and the engineer Francesco La Gala (CNR, Rome), enables one to measure the pressure of the left hand fingers on the violin fingerboard.

The first recording was made in order to measure the individual degree of pressure (baseline); the second recording, after the end of the first week. During this first week, the students practiced daily (25 minutes) with exercises taken from *Methods* by Schradieck, Kreutzer, and Salvatore. The third recording was achieved after the end of the second week, with daily application (25 minutes) of the *esercizi muti* by Sfilio.

Results

In the second recording, when compared to the first recording, it was found that only one student in seven played with higher pressure. In the third recording, also compared with the first recording, the results of the pressure were lower in all the students and in six out of seven, compared to the second recording, were lower.

Conclusions

Six students out of seven showed a considerable improvement in terms of pressure education on the fingerboard among the first, second, and third recordings, after the application of the Sfilio's Method. The application of Sfilio's exercises applied on a daily basis with rigor might improve the process of learning, training, and, consequently, the quality of technical performance.

Keywords

violin; pressure; Francesco Sfilio; sensor; sense of touch

GOOD PRACTICE IN VIOLIN PEDAGOGY: PSYCHOLOGICAL ASPECTS RELATED TO THE ACQUISITION OF MOTOR SKILLS

*Claudio Forcada-Delgado*¹*

¹ String Teaching and Learning, Valencian International University, Spain

* Correspondence: claudio@claudioforcada.com

Background

When I started my career as a violin teacher over twenty years ago, I assumed that it would be sufficient to reproduce the patterns and routines of my own teachers. However, I soon realised the limitations to this approach.

I began by studying how to teach technical skills and the repertoire, as well as strategies for both private and group lessons. Gradually my research moved towards the psychological aspect of teaching until I began to establish connections between the field of Motor Learning (ML) and my own teaching practice. Further training in the Suzuki method, Rolland and Zweig's pedagogies, as well as Havas' "New Approach" helped me to create a more eclectic method of violin teaching.

As a result of these explorations I have met outstanding teachers who come from a variety of backgrounds, what was the origin of my interest in the pedagogical characteristics that make them so successful. It was thus my interest both in successful teaching and ML that led me to the project of researching such successful violin pedagogy.

Aims

In this paper I set out to examine current practices in violin pedagogy and to relate these to ML. This will involve particularly focusing on how teachers consider the acquisition of motor skills in terms of teaching strategies, memory, and students' motivation. This paper sets out to answer the following research questions: (1) to what extent are Motor Learning and associated theories applied in major violin pedagogies such as Suzuki or Rolland, albeit without the teacher's awareness or acknowledgement; (2) do teachers in fact apply the teaching pedagogies they claim; and (3) can their success be attributed to the use of ML principles.

Method

22 teachers and 80 students representing five pedagogies have participated in this study. Data through lesson observation, interviews, and the use of questionnaires was provided, outlining comparisons between the teaching habits of the teachers.

Results

This study demonstrates the presence in violin teachers' methods of procedures considered as efficient under ML principles and brings to light differences in teachers' habits depending on their level of expertise. This is particularly related to the frequency and length of the instructions, control of pupils' feedback and the variety of strategies used to generate learning. To conclude I will compare pedagogies and teachers' procedures, emphasising those aspects related to successful teaching and ML. These outcomes open new lines for further research, which might help teachers to improve their effectiveness.

Conclusions

A primary source for ML research is found in the sports psychology literature but my research exposes a widespread lack of awareness of ML principles in the actual practice of violin teaching in Spain, UK, and the USA. While many teachers of violin pedagogy follow formal teaching programs and methods, for example Suzuki and Rolland, it is questionable to what extent these methods actually implement aspects of ML theory. I conclude that each, in its way, is drawing on certain ML principles even when the authors of the methods are evidently unaware of the link.

Keywords

effectiveness; violin; method; motor; learning

EMBODYING SINGING IN THE CHORAL CLASSROOM: A SOMATIC APPROACH TO TEACHING AND LEARNING

Stephen A. Paparo^{1}*

¹ Department of Music and Dance, University of Massachusetts–Amherst, USA

* Correspondence: spaparo@umass.edu

Background

For the purposes of this study, embodiment refers to the unity of all aspects of human function, including mental, physical, and emotional. This perspective acknowledges singing performance as embodied experience and the role of the body in the learning process. The notion of embodiment comes from the growing discussion in the literature, both in music as well as across other academic disciplines, as well as from my personal experiences as a singer, choral music teacher, and certified practitioner of the Feldenkrais Method®. The work of Merleau-Ponty and Shusterman provided a theoretical framework for the notion of embodiment and the inclusion of somatic practice in the choral classroom.

Aims

With the intent of improving teaching and learning in choral music education, the purpose of this study was to investigate how somatic (mind-body) instruction facilitated participants' understanding of embodiment in singing and affected their perceptions of their singing performance.

Method

Using an integrated case study and action-research design, I, as participant-researcher, led movement lessons based on the Feldenkrais Method® that were intended to elicit a greater understanding of embodiment in relation to singing. The participants were high school choral singers and their teacher from a suburban school in the Midwestern United States. Data included participant journals, group and individual interviews, and researcher field notes.

Results

Participants' perceived improvements in their singing performance related to reduction of tension, posture, breathing, resonance, articulation, and range. They gained a greater understanding of their use of conscious awareness and began to develop an understanding of embodied singing for musical and expressive performing. They also identified insights about learning to sing, including the importance of slowing down, reducing effort, sensing differences, and experiencing uncertainty before a new understanding emerged. Finally, the choral music teacher developed an embodied perspective of choral teaching, which included specific strategies for helping students to improve their performance.

Conclusions

Findings suggest that theoretical and practice-oriented perspectives on embodiment provided new possibilities for the choral teacher's practice and the students' learning. Somatic exploration as a part of instruction can help develop

singing that is expressed more holistically and is inclusive of mind and body. From this perspective, choral music teaching is, in essence, the facilitation of embodied singing.

Keywords

choral music education; Feldenkrais method; Merleau-Ponty; Shusterman; somaesthetics

Keynote paper

FORCE CONTROL AND MOVEMENT ORGANIZATION IN SKILLED MUSICAL PERFORMANCE

Hiroshi Kinoshita^{1*}

¹ Osaka University, Japan

* Correspondence: k.hiroshio929@gmail.com

Main contribution

Musical performance is undoubtedly one of the most complex sensorimotor skills that humans can acquire after years of dedicated training from an early age. Studies of expert musicians, including international competition winners, have thus provided rich information of highly and uniquely developed sensorimotor and cortical functions. An important key research focus of my team for the last two decades has been the study of the motor skills in instrumental musicians to control accurately the timing of complex movements of the upper limb and hand/fingers through the precise modulation of muscle activation patterns to adjust the timing and sound level of the tones. In this presentation, I will share knowledge gained from our studies on the issue of force control made by highly trained piano, violin, and French horn players.

A simple downswing, or free-fall of the arm through the use of gravity to strike a piano key, requires force generated by the large shoulder-girdle muscles to be transferred to the fingers through joint torques resulting from intersegmental dynamics. Kinematic and kinetic motion analyses, along with electromyography, have clearly demonstrated that, compared with novices, highly trained pianists more effectively exploit gravitational force to use muscles more efficiently by sparing the smaller muscles of the forearm and hand which fatigue easily. A force-sensing piano key devised along with a motion capturing system has allowed us to show a clear difference in key-reaction force and movement organization during the key-depressing phase between two different touches—the “struck” touch with the hand dropped from above the keys and the “pressed” touch from key-level—and compared at different dynamics and tempi.

On the violin, string gripping by the left hand and instrument stabilization by the left side of the chin were examined using a 3D force sensor installed on the finger plate as well as a uniaxial force sensor installed under the chin rest. A much higher level of the string gripping and instrument stabilizing forces than we expected were observed in expert performance, though the force amplitude varied largely among the players. Feedforward control of instrument stabilization with left finger action was another feature of expert performance.

Force control in brass performance concerns mouthpiece/lip interaction force. Although there have been some studies on this issue by previous researchers, the details of this force control in virtuoso performance still remains less clear. Our recent attempt to use a wireless mouthpiece force transducer will be briefly introduced.

Keywords

biomechanics; motor control; piano; violin, French horn

Thematic session

Performance education I

EXPLORING INTERPERSONAL COMMUNICATION IN ONE-TO-ONE INSTRUMENTAL LESSONS: PRELIMINARY RESULTS

Clarissa Foletto^{1*}, Sara Carvalho¹, and Andrea Creech²

¹ Department of Communication and Art/Inet-md, University of Aveiro, Portugal

² Institute of Education, University College London, UK

* Correspondence: clarissafoletto@ua.pt

Background

Interpersonal communication plays an important role in one-to-one instrumental teaching and learning. It has been noted in several studies as one of the skills that distinguish expert teachers from their less-expert counterparts. Of great importance is the need to master a technical vocabulary, in order to explain and demonstrate an idea. However, such technical vocabulary contains many words identified by the student as labels for concepts other than those the teacher intends to convey. Therefore, one of the teacher's challenges while teaching an instrument is to approach complex content (that involves a specific vocabulary) using effective and clear communication, which can be understood and recalled by the student later. Thus, one can assume that the phenomenology of communication in one-to-one instrumental learning seems to be of paramount importance.

Aims

This study aims to understand the phenomenology of interpersonal communication in instrumental lessons.

Method

An exploratory case study involving observation of 16 one-to-one violin lessons, at different venues in the UK, and 12 semi-structured interviews was conducted. The participants (n=12; seven females and five males) were four teachers (aged between 41 and 62) and eight violin students (aged between 9 and 15), i.e. two per teacher. Two sequential lessons were videotaped and an interview was conducted after the first lesson was observed. A thematic analysis has enabled to identify perceptions and strategies regarding instructional communication used by teachers to communicate musical ideas. Finally, teachers' intentions and students' perceptions were compared in order to evaluate the students' recall of what teachers had intended to communicate in their lessons.

Results

Preliminary results suggest that each teacher had a pedagogical, multimodal vocabulary used according to student personality, socio-cultural background, learning style, age, gender, and stage of learning. Such vocabulary emerged as a set of summarized terms supported through non-verbal language used by the teachers to make the instruction clearer. Moreover, this vocabulary was embodied in eight communication strategies identified by the analysis of the dataset. Embedded in the 28 instructions selected, the most used strategies were *demonstrating* (9); *encouraging to play freely* (7); *using metaphors* (4); and *physical modelling*. On the other hand, the comparative analysis of the interviews revealed that students recalled the meanings of the instructions when teachers approached strategies as *physical modeling* and *using metaphors*.

Conclusions

Data analysis brought to light that instructions embedded in some of the strategies used by teachers, i.e. *demonstrating* and *encouraging to play freely*, weren't always understood by the students. Nevertheless, it was clear in the comparative interview analyses the potential use of *metaphors* and *physical modeling* as most-recalled strategies. These preliminary results point to the importance of a respectful negotiation of meaning between teacher and student. In addition, the emergent cues in the pedagogical vocabulary shall be empirically verified as a means to improve such communication.

Keywords

instrumental teaching and learning; interpersonal communication; one-to-one learning; communication strategies; instructional communication

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POLYMATHS, JAZZ, AND SPORTS IMPROVISATION: MOVING THE SONGWRITER FROM PRO-C TO BIG-C CREATIVITY

Clive Harrison¹*

¹ Design, Communication and IT, University of Newcastle, Australia

* Correspondence: clive@clivemusic.com.au

Background

This paper generalizes task-specific (but dissimilar) skills from the jazz concert stage and from the hockey field into the domain of creativity research and, specifically, songwriting.

Aims

This research sought to find clues to the question “what moves the creative agent along the continuum from ‘Pro-c’ creativity into the realm of domain-changing ‘Big-C’ creativity?”

Main contribution

The research suggests that an ability to transfer domain-general skills across domains is the difference, and that *polymaths*, or persons with multi-disciplinary capacities, are more likely to make the critical distinctions necessary. A correlation is implied between pattern-recognition across dissimilar domains and “H” creativity, as necessary in order for “Big-C” or “H” creativity to be achieved. The implication is that a Pro-C songwriter is likely to write song “propulsions” that do not challenge where we now are, nor move radically away in some new direction; the Forward Incrementation described by Sternberg, Kaufman, and Pretz. If, by contrast, a polymath (or anyone not so described, but still with expertise across two very different fields of endeavor) manages to transfer domain-specific or domain-general skills across unrelated disciplines, we may well find that the resultant creative products or propulsions are different: the type of Advanced Forward Incrementation, Synthesis, or other propulsions that move *away from where we are now*.

Implications

The capacity for exceptional pattern-recognition; to generalize and subsequently transfer *domain-general* skills across domains, the realm of the polymath, is the difference. Polymaths are simply more likely to make the distinctions that less expert, less inter-disciplined persons cannot, and thereby discover what is transferable. Analogous pattern-recognition across dissimilar domains is connected to the type of “H” creative synthesis we see in polymaths or exemplar creative. Highly desirable for the songwriter, then, would be a strong capacity for pattern recognition combined with expertise in multiple disciplines (itself an opportunity for fruitful asynchrony). In order to give oneself the best opportunity for potential “Big-C” or “H” creativity, and for it to be recognized subsequently as both novel and useful by the field, then it would follow that the following would be essential creative prerequisite abilities:

- (1) Interdisciplinary expertise in at least two domains.
- (2) Higher order thinking skills of analysis, evaluation, and creation.
- (3) Powers of differentiation, pattern recognition, observation, and evaluation *enough* to make informed distinctions that others cannot see.
- (4) The inductive capacity to use information and observations to hypothesize potential generalities; and the resources (including time) to test resultant theories for validity and reliability.
- (5) A high capacity for metacognitive thought.

Keywords

big-C; domain-general; polymath; songwriting

MUSIC UNDERGRADUATES' USEFULNESS AND IMPORTANCE EXPECTATIONS: THE BOLOGNA PROCESS FROM AN AUSTRALIAN UNIVERSITY PERSPECTIVE

Dominic G. Harvey^{1*}, *Jane W. Davidson*², and *Chenicheri Sid Nair*³

¹ School of Music, University of Western Australia, Australia

² Creative and Performing Arts, Melbourne Conservatorium of Music, University of Melbourne, Australia

³ Centre for Education Futures, University of Western Australia, Australia

* Correspondence: dominic.harvey@research.uwa.edu.au

Background

The Bologna Process of higher education has been introduced gradually to Australian universities since 2008. The model generalized the student experience by limiting undergraduate specialization and promoting a liberal arts structure. This has posed an interesting situation for commencing music undergraduates since expertise and expert performance research argues that extensive long-term commitment through practical engagement and specialized tuition are requisites to achieving mastery in music performance. Furthermore, motivational research shows that the majority of expertise development in music is accessed and reinforced in pre-university years predominantly through specialized private music tuition. From this contextual literature, one would expect incoming university music undergraduates to have expectations of study founded on their pre-university music tuition and the musical activities previously accessed and experienced. Usefulness and importance measurements gauged commencing music undergraduates' expectations of university study in 2013 through a cross-sectional snapshot of three representative Australian university music schools, one operating the Bologna styled model.

Aims

This study investigated how new music undergraduates relied upon previous experiences to inform expectations of music undergraduate study. Assumptions: pre-university music instruction and performance would positively affect undergraduate expectations; expectations would reflect preferences towards certain study units (e.g. performance).

Method

Music schools at The University of Western Australia (UWA) with its recently implemented Bologna styled arts degree, The Edith Cowan University (ECU), and The Melbourne Conservatorium of Music (MCM) were selected. Commencing music undergraduate cohorts for 2013 (n=34; n=65; n=78 respectively) completed a pen and paper questionnaire. Quantitative data were collected from 4-point Likert scale items concerning expectations of university music units ("not at all useful/important" to "very useful/important"). Qualitative data were collected from items concerning pre-university music instruction access, music performance experiences, and the music instruction and performance focus (e.g. solo/ensemble).

Results

Across the three schools the majority of commencing music undergraduates received pre-university music instruction privately; this focused upon performance, and the performance focus emphasized solo more so than ensemble experience. Performance units were expected to be the most useful and important, academic units less so although these would be more useful and important to commencing undergraduates than generalized units.

Conclusions

Pre-university music training and experience emphasis mainly prepared students for either individual or ensemble music performance. Academic music study was perceived less of an attribute. University music performance units were universally perceived to be more useful and important than academic and generalized units across the cohorts. Previous experiences appeared to influence perceptions and these informed commencing music undergraduate expectations. These results suggested that students would find a liberal arts university model challenging, given it appeared at odds with their specialized expectations. Ongoing study would illuminate this possibility.

Keywords

Australia; Bologna; music undergraduates; expectations; usefulness and importance

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Thematic session

Evaluating performance II

HOW IS THE PROFICIENCY EVALUATION ACHIEVED? EXPRESSIVE AND TECHNICAL EVALUATIONS OF PIANO PLAYING

Masanobu Miura^{1*}

¹ Faculty of Science and Technology, Ryukoku University, Japan

* Correspondence: miura@mail.ryukoku.ac.jp

Background

Piano proficiency evaluations are often made in piano lessons, but to what extent expressive and technical evaluations impact proficiency evaluation has not yet been clarified.

Aims

This research intended to investigate the contribution of expressive and technical evaluations to the proficiency evaluations of pianists playing a one-octave scale.

Method

Pianists playing a one-octave scale were recorded as MIDI data using a MIDI-equipped acoustic Yamaha piano. 336 performances (by ten amateur and four expert pianists, for twelve keys, with right and left hands) were obtained. Performances in the keys of C and B major with the same fingerings in the right hand were extracted. The onset, MIDI-velocity, and duration of playing time were represented as the combination of a spline curve and deviation from it, where the spline curve passed through the representative points of note clusters classified by fingering. The author focused on the role of the spline curve and deviation from it in terms of proficient, expressive, and technical evaluations. The author generated MIDI playing by swapping the spline curve and deviations in a distinct recording in such a way that generated performances with distinct features. The 336 excerpts were first evaluated by five piano experts. In turn, the best three and worst three performances in C and B major were extracted. Then, the spline curves and deviations were interchanged among them. Playing generated by only the spline curve or the deviation was also employed. The categories of stimuli were: GOOD (original, evaluated as most proficient), BAD (original, evaluated as least proficient), GG (best spline with best deviation), GB (best spline with worst deviation), BG (worst spline with best deviation), BB (worst spline with worst deviation), Gf (best spline only), Bf (worst spline only), fG (best deviation only), and fB (worst deviation only). Ten amateur pianists were asked to rate the proficiency, expressiveness, and technical quality of the stimuli. Moreover, a regression analysis was conducted with the proficiency score as the dependent variable and the expressive and technical evaluation scores as independent variables.

Results

Correlation coefficients of evaluation scores by the ten amateur pianists were almost consistent (avg. of $r=0.801$, $n=96$) thus showing a reliability of evaluation scores. According to the average scores, performances evaluated as most proficient were the GOOD, followed by Gf, GG, Bf, fG, GB, fB, BG, BB, and BAD. Results showed that (1) if a performance had a least proficient feature in either spline or deviation, it was always evaluated as not proficient; (2) expressive evaluation depended on the spline curve whereas technical evaluation depended on the deviation; and (3) the linear regression showed the ratio of weights as 2:1 for expressive and technical evaluation scores on proficiency evaluation scores (adjusted $R^2=0.88$), which implies that the ideal ratio of practice on piano playing was 66% for expression and 34% for technical aspects if the performer is to achieve the best effective evaluation for proficiency.

Conclusions

Proficiency evaluations result from a combination of expressive and technical evaluations with a ratio of 2:1 in a basic piano performance.

Keywords

proficiency evaluation; expressive evaluation; technical evaluation; piano; spline curve

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COMMONALITY AND DIVERSITY OF PROFICIENCY EVALUATION CRITERIA FOR PIANO PERFORMANCES BETWEEN EXPERTS AND NON-PIANISTS

Satoshi Miyawaki^{1*} and Masanobu Miura²

¹ Graduate School of Science and Technology, Ryukoku University, Japan

² Faculty of Science and Technology, Ryukoku University, Japan

* Correspondence: miyasato5246@yahoo.co.jp

Background

Previous studies on piano proficiency have reported that highly skilled performances are easy enough for people to evaluate consistently. However, differences in proficiency evaluation due to piano expertise have not yet been revealed.

Aims

This paper intended to investigate the difference in factors of proficiency evaluation due to piano expertise, using the piano excerpt *Für Elise*.

Method

The authors employed 30 pianists, three of whom were expert pianists and the other 27 students of our university, as subjects of our recording experiment. All pianists were asked to play the excerpt five times, and performance data totalling 150 patterns were obtained. Five expert pianists and 10 non-pianists were then asked to do a 10-step proficiency evaluation for the performances of the excerpts. To confirm the consistency of evaluation, correlation coefficients between experts and non-pianists were obtained. In addition to the evaluation, all performances were classified into “Good” or “Bad” by observing the 10-step scores given by experts or non-pianists, respectively. Consequently, performances are classified into four groups: “both experts and non-pianists evaluated as Good,” “only experts evaluated as Good,” “only non-pianists evaluated as Good” and “both experts and non-pianists evaluated as Bad,” labelled G_{EGN} , G_{EBN} , B_{EGN} , and B_{EBN} respectively. The features of the four groups were analyzed using a spline curve that represented the trend along the duration of each performance. Instantaneous tempo, MIDI-velocity, and duration for each note along time were represented by a combination of the spline curve and deviation from it. In turn, values of parameters obtained by the spline curves were compared among the four groups. Accordingly, eigenperformance (performance ingredients obtained by principal component analysis) was obtained to be analyzed. To confirm whether the eigenperformances really represented performance features, a listening evaluation experiment was conducted using synthesized performances from the eigenperformances as stimuli.

Results

The correlation coefficients for proficiency scores among evaluators ranged from 0.25 to 0.65 (avg=0.48, n=150) among the five experts and from -0.54 to 0.59 (avg=0.63, n=160) among the ten non-pianists. As a result, correlation coefficients of experts confirmed a high commonality, whereas non-pianists confirmed a low commonality. Experts tended to evaluate performances as skilled when performances had a constant tempo, a constant duration, or little change in MIDI-velocity, whereas non-pianists tended to evaluate performances as skilled when performances had a sudden change in tempo, a large change in duration, or a sudden change in MIDI-velocity. The validity of obtained features given by eigenperformances was confirmed in our listening experiment, where performances synthesized by eigenperformance of performances (PC performance) were evaluated as skilled or unskilled and, like the original performances, labelled G_{EGN} , G_{EBN} , B_{EGN} , and B_{EBN} .

Conclusions

Performance features were analyzed by eigenperformances so that commonality and diversity of proficiency evaluation criteria for piano performances could be found between experts and non-pianists.

Keywords

proficiency evaluation; principal component analysis; piano; *Für Elise*; spline curve

Acknowledgments

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TIME TO DECIDE: THE EFFECTS OF EXTRA-MUSICAL VARIABLES ON CONTINUOUS RATINGS OF PERFORMANCE QUALITY

George Waddell^{1*} and Aaron Williamon¹

¹ Centre for Performance Science, Royal College of Music, UK

* Correspondence: george.waddell@rcm.ac.uk

Background

Performance quality evaluation is endemic to music education. From the entrance audition to the graduate examination, the student's path is regularly placed in the hands of the techniques and experts used to judge musical performance. The criteria of quality evaluations have been studied at length, as have the myriad musical and extra-musical variables—from the performer's dress to the evaluator's experience—that impact upon them. These studies, however, provide conflicting and troubling accounts of the reliability and validity of such assessments, and have focused on overall ratings given after the performance. Continuous measures techniques allow a performance to be rated over time, taking advantage of music's temporal nature and providing greater resolution with which to study how the evaluation process unfolds. Such techniques have been used at length in examinations of audience arousal, attention, and affective response, but have rarely been applied to quality evaluations.

Aims

This study provided the first application of continuous measures techniques to examine the immediate and overall effects of extra-musical performance variables on the quality ratings of recorded performances. The performer's stage entrance, behaviour during performance errors, and audience response were manipulated and compared across evaluators of varying experience.

Method

A Chopin etude was professionally video-recorded and altered resulting in six unique trials, each giving the appearance of an undoctored live performance with a large audience. Trials were manipulated to include either an inappropriate (unconfident) stage entrance, stark performance error with or without corresponding negative facial reaction, negative facial reaction without accompanying performance error, or rapturous audience applause (as opposed to a standard, polite response). New software was developed to allow continuous quality ratings to be given while watching the video. 125 participants of varying musical experience gave continuous quality ratings of a randomly selected trial, followed by overall ratings of performance quality.

Results

Repeated-measures analyses revealed that (1) an inappropriate stage entrance significantly reduced the time taken to form a first judgement without affecting the final rating, (2) an aural performance error with corresponding negative facial reaction caused an immediate drop in perceived performance quality that persisted to the final rating, and (3) the same aural or visual stimuli presented independently were not penalized in the overall rating. The evaluation processes of experienced versus inexperienced musicians were largely the same, with some variation concerning the interpretation of the facial reaction to a performance error. No effect of audience response was found.

Conclusions

These data demonstrate that continuous measures methodologies allow for increased precision in monitoring the immediate and overall effects of extra-musical performance quality evaluation. The effects of stage entrance and interactions between aural and visual performance errors would not have been apparent in overall ratings, revealing a complex process of musical decision-making that remains to be understood. These methodologies and findings hold implications for both institutions wishing to conduct performance assessments as well as the students and teachers preparing for them.

Keywords

evaluation; assessment; quality; continuous measures; extra-musical variables

Acknowledgments

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Thematic session

Analyzing pianists' movement

PIANISTS' HAND BIOMECHANICS: HERITAGE AND NEW KNOWLEDGE

Sang-Hie Lee^{1} and Angel Luciano²*

¹ School of Music, University of South Florida, USA

² Department of Pediatrics, Division of Neonatology, University of South Florida, USA

* Correspondence: slee@usf.edu

Background

Skilled piano technique involves finger technique, arm weight, relaxation, weight transfer, and physiological mechanics of the torso. Piano techniques have evolved over time in parallel with the change of instrument and stylistic pianism. While pedagogues have taught ways to produce the desired tones with controlled finger-touch in coordination with the arm and the body, hand size and shape have not been a part of our piano pedagogy heritage until recent years. We wonder if skilled touch control may be influenced by biomechanics of piano-playing hand.

Aims

The study was aimed to compare skilled pianists hand biomechanics and their *evenness* touch control in tempo and dynamics.

Method

Skilled pianists were classified into four groups: artists (n=9), graduate pianists (n=8), undergraduate pianists (n=5), and injured professional pianists (n=9). Hand biomechanics were measured by hand length and width, composite finger lengths, composite finger spans, hand and arm weights, weight ratio between them, and ulnar deviation at the wrist. Performance outcomes in playing seven piano tasks were measured by temporal and dynamic evenness of MIDI data, quantified in a hybrid acoustic-electronic piano. DataGlove 5DT was used to capture motion at 14 finger joints to compare an injured and a healthy pianists' joints motions in playing a rapid scale.

Results

There were no differences in hand biomechanics among the four pianist groups. Significant differences in hand size, shape, and weight were observed, as expected, between male (n=16) and female (n=15) pianists. However, surprisingly, there was no significant difference between male and female in finger spans 1-5, 2-4, 3-5, ulnar deviation, and hand-arm weight ratio. In legato playing, artists, graduate, and injured pianists were similar in articulation ($p=0.83$, $p=0.523$) and tempo evenness ($p=0.60$, $p=0.15$). Undergraduate pianists showed significant differences in both temporal and articulation evenness control ($p=0.045$, $p=0.045$). Injured ($p=0.024$) and undergraduate pianists ($p=0.042$) showed significant differences from the other two groups in tempo evenness in staccato playing. An injured and a healthy pianist's motion data showed a large variation in MCP and PIP joints.

Conclusions

Our study demonstrated that the knowledge of pianists' hand biomechanics can support effective skills development and the understanding of the relationship between hand biomechanics and touch control were essential to pianists' injury-prevention and rehabilitation.

Keywords

skilled piano playing; hand biomechanics; pianists' finger motion analysis; piano pedagogy; heritage

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RELATING CONTINUOUS HAND MOVEMENT TO FINGER-KEY CONTACT LOCATION IN PIANO PERFORMANCE

Jennifer MacRitchie^{1,2} and Andrew McPherson^{3*}*

¹ MARCS Institute, University of Western Sydney, Australia

² Conservatorio della Svizzera Italiana, University of Applied Sciences and Arts of Southern Switzerland, Switzerland

³ Centre for Digital Music, Queen Mary University London, UK

* Correspondence: j.macritchie@uws.edu.au; a.mcpherson@qmul.ac.uk

Background

Piano touch is a tool used by pianists that describes embodying intentions for the sound, culminating in a particular movement at the finger as it presses the key. Recent biomechanical studies of piano performance have explored the keypress actions involved in single tone melodies, using various devices to record motion of the fingers as well as that of the vertical movement of the key. Focus in these studies has been directed towards the vertical keypress action, aligning joint angle velocity with the timing of the vertical key depression. Movement in the plane of the keyboard remains understudied, particularly the relationship between gestures made above the keyboard and the initiation of individual keypresses.

Aims

Using a combination of camera-based motion capture and capacitive sensing techniques, we aim to investigate how hand and finger motion across successive keypresses relates to finger-key contact location on each key. Camera and capacitive sensing systems have complementary strengths: the camera follows the large-scale gestures between keypresses, while the capacitive sensors provide precise measurements of finger locations on the key surfaces as well as the time of contact and release. Combining the two modalities provides a detailed account of a performance not possible with any single sensor system.

Method

A monocular image-motion capture system (FingerTracker) was placed above a Yamaha C5 grand piano, recording the continuous movements in the XY plane of 32 colour markers on the hands. The piano was also equipped with capacitive touch sensors on the surface of each key (TouchKeys) recording finger-key contact locations. MIDI data for keypresses was recorded using infrared sensors at the back of the keys (Moog PianoBar). In post-processing, the three data sources were aligned in time, and the optical markers at the distal end of each finger were used to automatically assign fingerings to each touch and MIDI measurement. Motion analysis was then performed for each finger, including touch onset and release versus keypress timings and motion between notes compared to motion on the key surface.

Results

A case study using these devices to monitor finger-key interactions in two Brahms exercises (WoO 6, Nos. 13 and 40) is presented. Finger curvature, timing analyses between touch onset and key onset, and quantity of movement analyses between key transitions demonstrate the types of anticipatory and keypress event interactions occurring between finger and key.

Conclusions

A novel technique is presented for integrating two sensor systems for piano performance analysis. This technique allows measurements of the gestures made by a pianist above the keyboard and the touches made on the key surface to be linked. Measurements using this system may be used to help pianists visualize the interaction between finger and key.

Keywords

motion capture; capacitive sensing; piano touch; gesture; finger-key interaction

Acknowledgments

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SPATIAL ACCURACY IN PIANO PERFORMANCE WITH AND WITHOUT AUDITORY AND VISUAL INFORMATION

Chie Ohsawa^{1,2*}, Ken-ichi Sawai³, and Minoru Tsuzaki¹

¹ Faculty of Music, Kyoto City University of Arts, Japan

² Japan Society for the Promotion of Science, Japan

³ Faculty of Design, Kyushu University, Japan

* Correspondence: ohsawachie@gmail.com

Background

We previously found that trained pianists had inaccurate spatial memory of position of remote keys. In addition, pianists seemed to flexibly transfer the spatial representation of the keyboard based on the given reference point. Therefore, pianists must need real-time acquisition of information on the target key position or the reference point. However, the roles of information perceived during their performance in various modalities are unknown and should be described to reveal the mechanism of appropriate performance for realization of intended notes.

Aims

The aim of this study was to examine the role of online acquisition of auditory and visual information in successful finger positioning on target keys on the piano.

Method

Five advanced amateur pianists participated in the experiment. They played two excerpts of musical pieces which they were able to play confidently by heart. The intervals of each adjacent note were smaller in one excerpt and larger in the other excerpt. We set four conditions for each excerpts: “Ordinary” (OD), “No-sound” (NS), “No-vision” (NV), and “No-sound & No-vision” (NSNV) conditions. In all conditions, the participants played the excerpts on the electric piano without the music scores. In the OD condition, they played with visual information of the keyboard and their hands and with sound feedback via headphones. In the without-vision conditions (the NV and the NSNV conditions) the participants played with their eyes closed. In the without-sound conditions (the NS and the NSNV conditions) the sound output was turned off. The performance data were recorded as MIDI data. We calculated two types of spatial errors: the key deviation errors and the key interval deviation errors. The former represented the deviations (mm) of the touched key from the target key, and the latter represented the deviations (mm) of “the spatial intervals between the two successive keys actually played” from the original intervals. The accuracy of touching a key relative to the target key was examined for each note played in the excerpt.

Results

While the participants made almost no touching errors in the OD and the NS conditions in the two pieces, emergence of errors largely depended on existence of the wide leaps in the excerpt in the NV and the NSNV conditions. We focused on the errors of the excerpts with wide leaps in the without-vision conditions in the following comparison: the sizes of *the key deviation errors* in the NSNV condition were larger than those for the NV condition; the error sizes in the NSNV condition clearly diminished when we adopted *the key interval deviation errors*.

Conclusions

In the performance with wide leaps, acquisition of visual information played a crucial role. The visual information seemed to contribute in confirming the position to touch. On the other hand, auditory information was not used in finding the position usually; auditory information seemed to inform the pianist of their current finger position as a reference point, especially when the visual information was not available.

Keywords

keyboard; piano; visual feedback; sound feedback; spatial accuracy

Acknowledgments

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Poster session II

THE EFFECTS OF THE MOVEMENT OF THE BODY TO MUSIC PERFORMANCE

Keiko Asakura^{1*}

¹ St. Mary's College, Nagoya, Japan

* Correspondence: k.k-asakura@nifty.com

Background

Multi-modal functions have attracted interest. The interest has focused on research into interaction between auditory and visual sensations. We have the sixth sensation: proprioception that gathers information from within our body, about position and movement. The addition of proprioception would help us to enjoy and understand music profoundly.

In the field of early childhood education, it is generally accepted that singing while moving their fingers and body is a more effective education for young children, known as the theory of F. Fröebel.

Aims

The aim of this research was to examine the hypothesis that when we sing a song together with the movement of a body related to the song, we could enjoy and understand the song more than without the movement.

Method

Over 50 participants who will be teachers in early childhood education were put into four groups: new students at a college, seniors at the college, students in a special course at the college, and students at a university. They took part in the experiments separately. The participants of each group were divided into another two groups; the members of the one group learned an unknown children's song by listening to it three times without any bodily movements, while the members of the other group learned the same unknown song by watching movements related to the lyrics and the rhythm of the song three times. They then were asked to sing with or without the bodily movements from memory and to write down their feelings.

Results

Comparing the performance and the description of the two groups, I examined how proprioception could further increase joy derived from music, and help those who haven't had much musical experience to learn a song more easily. However, for a person with enough musical ability to learn an unknown song after only three listens, it doesn't matter whether they sang together with the movement of a body. Furthermore, I found that the will of the participants to try to learn the song after only three listens might influence the results.

Conclusions

Learning a song together with the movement of a body could provide a more effective music education, especially for those who have limited musical experience, including young children. The findings of this research should contribute to body involvement in music education.

Keywords

multi-modal function; proprioception; movement of a body; children's song; music education

THE STRESS OF PERFORMING: CARDIOVASCULAR RESPONSES TO MUSICAL PERFORMANCE

Lisa Aufegger^{1*}, *David Wasley*², and *Aaron Williamon*¹

¹ Centre for Performance Science, Royal College of Music, UK

² Cardiff Metropolitan University, Llandaff Campus, Cardiff, UK

* Correspondence: lisa.aufegger@rcm.ac.uk

Background

Stress causes measurable alterations to the regularity of beat-to-beat (R-R) fluctuations, also called HRV. The most commonly assessed frequency components in HRV are the low frequencies, assumed to reflect the SNS and the baro-reflex, and the high frequencies, believed to represent the PNS and the respiratory sinus arrhythmia: naturally occur-

ring heart rate variations due to breathing. HRV has been examined under a variety of conditions, such as mental stress or public speaking, and has been shown to vary in magnitude and direction depending on performance context, with more rapid and a greater magnitude of reactivity combined with limited and slower recovery in naturalistic, uncontrollable, and social-evaluative conditions. However, little investigation in musicians' cardiovascular responses to musical performance has been done.

Aims

The aim of this study was (1) to provide an integrated understanding of musicians' HRV reactivity to stressful performance situations and to do so while examining the timing of peak stress and (2) to compare HRV analyzed in terms of LF and HF activity with the MSE measures performed in Complexity Science. Measures used in Complexity Science are based on the concept that systems are unpredictable, complex, and infinitely diverse.

Method

Eleven violinists from the Royal College of Music, London, and six flautists from the Conservatorio della Svizzera Italiana, Lugano, participated in the study. They were required to perform the *Allemande* from J. S. Bach's *Partita No. 2 in D minor for solo violin* (BWV 1004) or the *Allemande* from J. S. Bach's *Partita in A minor for solo flute* (BWV 1013), in both a rehearsal setting and in front of an audition panel. Electrocardiographic data (ECG) was recorded before and during each performance. In addition, participants completed a self-report on anxiety before each condition.

Results

The results provide evidence for significant physiological changes experienced by musicians before and during ($F_{1,16}=6.848$; $p<0.05$; $\eta^2=0.30$) and between the low- and high-stress condition ($F_{1,16}=9.763$; $p<0.01$; $\eta^2=0.37$). The peak physical stress level was detected for the five-minute pre-performance period, and was also confirmed by the self-reports on anxiety ($t_{16}=-2.735$; $p<0.05$). Both standard and state-of-the-art measures were used to assess the underlying dynamic of the heart rate regulated by the autonomic control, yet the MSE measure was advantageous by providing a greater sensitivity in analyzing HRV.

Conclusions

While this study offers a greater understanding of how standard and MSE analysis can be applied to data collected in musical performance conditions, further data analysis should be considered alongside other features, such as breathing, appraisal, and coping strategies. Such a combined approach will enable the enhancement of stress reduction tools that are applicable to both music and other performance domains.

Keywords

low- and high-stress musical performance; heart rate variability; state anxiety; frequency domain analysis; sample entropy measure

TIMBRAL AND MELODIC CHARACTERISTICS OF PERSIAN AND KURDISH SINGING

Hama Biglari^{1} and Johan Sundberg²*

¹ Department of Musicology, Uppsala University, Sweden

² Department of Speech, Music and Hearing, KTH Royal Institute of Technology, Sweden

* Correspondence: hama_biglari@hotmail.com

Background

The solo singing in the courtly heritage of Persian avaz and the variety of the Kurdish folklore are examples of living oral traditions that are mostly sung in free rhythm in the higher part of the vocal range with quick, quasi-improvised melodic ornamentation.

Aims

Our aim was to find characteristics of Persian and Kurdish singing in terms of voice source properties and formant strategies.

Method

Audio and electroglottograph (EGG) signals were recorded from stylistically representative male and female singers singing typical song excerpts from each tradition as well as scales and isolated melodic ornaments. Voice source parameters and formant frequencies (F1 & F2) were measured from inverse filtering of the audio signal, using the cus-

tom made DeCap (Svante Granqvist, KTH) and the commercial Soundswell™ softwares. Fundamental frequency F_0 was measured from the EGG signal using the Soundswell CORR tool. To allow measurement of P_{sub} the singers either repeated the songs, replacing each syllable of the lyrics with [pæ], or they sang diminuendo sequences of [pæ] on different pitches, and P_{sub} was recorded as the oral pressure during the occlusion for the consonant /p/.

Results

Our studies clearly showed systematic occurrence of formant tuning in both Persian and Kurdish singing throughout a sixth in the upper part of their voice range, mostly above Bb3 (235 Hz, approximately) in song, and sometimes throughout an octave (175-350 Hz) in scales. Here, the singers typically tuned F_1 to the second spectrum harmonic and sometimes also F_2 to a higher harmonic.

In melismatic embellishments, the melody tones were sung in modal register, and were preceded by short falsetto episodes, whereby F_0 quickly jumped up to a peak before the onset of the following melody tone. This phenomenon has been observed also in previous studies of traditional Persian singing.

The data further indicated an elevated degree of glottal adduction combined with high P_{sub} , i.e. typical characteristics of pressed phonation. Combined with the strong second harmonic achieved by formant tuning this phonation type seems to produce a somewhat yelling voice quality which seemed characteristic of both male and female Persian as well as Kurdish singing.

Conclusions

While pressed phonation has been seen as a threat to vocal health in the Western classical operatic tradition, it seems quite common in various Middle Eastern vocal styles, apparently without causing damage to the singers' voices. Also interesting is the evidence of formant tuning, which is regarded by a sine qua non among some teachers of singing representing the Western classical style of singing.

Keywords

Persian avaz; Kurdish; formant tuning; p_{sub} ; voice source

MODERN MUSIC AND ANCIENT PATTERNS: INTERPRETING *AUTUMN* BY SILVIA BERG

Ana Cervantes^{1*} and Silvia Maria Pires Cabrera Berg²

¹ Yamaha Artist, Independent Concert Pianist and Teacher, Mexico

² Department of Music, University of São Paulo, Brazil

* Correspondence: laquijote@gmail.com

Background

Enormous access to information and multiple listening possibilities transform composition and interpretation in the 20th and 21st centuries into a non-linear process *par excellence*. In such a context, *Autumn* for piano solo by Silvia Berg, a piece which simultaneously makes use of a modern vocabulary and of techniques which date back to the late 1500s, is particularly apropos. *Autumn*, though it lasts less than 10 minutes, feels expansive and wide-ranging: a large building of generous spaces. Berg creates a solid structure atop which all sorts of figuration can leap and tumble, whirl and spin, sounding almost like improvisation and reminding us vividly of the virtuosic *toccati* created by composers such as J.S Bach and Carl Philipp Emmanuel Bach. Berg's music is a direct descendant of CPE Bach's and *Autumn* is a particularly good example of that lineage.

Aims

This presentation will outline some of the varied processes and perspectives employed to put ancient and modern into dialogue, to prepare an interpretation which would eloquently convey the processes of transformation and transmutation inherent in the work. The contrasts between blazing vermillion and the anticipation of intense and silent whiteness are permeated by memories and set forth through distinct resonances, demanding careful use of the pedal as well as the imagination and construction of a sonic universe which does not necessarily exist in older works, at least in literal form.

Main contribution

It is critical that teaching of interpretation and performing find ways to develop the ability to move between different layers of musical meaning and their interdisciplinary correlations with other structures.

Thus, to paraphrase Ralph Kirkpatrick's questions from the famous Preface to his edition of Scarlatti Sonatas: how do we work on a new piece? How is it different from entering into a relationship with a piece from the "established" repertoire which is new to us? Shouldn't one of performers' goals in preparing the interpretation of a new piece be to have it ultimately enter the repertoire?

Implications

In formal terms *Autumn* is structured as a toccata, conforming almost exactly to the scheme originated by Claudio Merulo in the late 1500s and still used by J.S. Bach, Buxtehude, and others, over a century later: principal sections of rapid passagework interleaved with three contrasting sections, the first choral and the other two monophonic. Here we must prepare an interpretation of a modern piece, with an ancient cathedral in mind: a structure in which each stone or layer has been built by one composer but also by earlier generations of creators.

Keywords

Autumn; toccata; piano solo; transformation; transmutation

REDISCOVERING PERFORMANCE IN HEALING: WHAT CAN WE LEARN FROM SHAMANS AND MEDICINE MEN?

Atay Citron^{1*} and *Anat Biegon*²

¹ Theatre Department, School of the Arts, University of Haifa, Israel

² Neurology Department, School of Medicine, Stony Brook University, USA

* Correspondence: aticitron@gmail.com

Background

Performance is paramount in traditional healing rituals. Besides being expert healers, shamans and medicine men are trained performers. Their performances consist of elements such as drumming, chanting, singing, dancing, role playing while in trance, ventriloquism, magic, acrobatics, comedy, and more. These acts are usually performed publicly in symbolic costumes and often with masks, fans, rattles, and other props. Although traditional healers may use herbal or animal-based preparations, they never administer them without the appropriate performance. From a Western perspective, such performative behavior can be understood principally as inducing patients' faith in the performer's supernatural healing powers. Faith leads to an expectation of a successful outcome, which supposedly triggers a self-healing mechanism in the patient.

Western medicine, relying on scientific and technological developments in surgery and pharmacology, has moved away from healing through performance. Still, patients' faith in their physicians' ability to heal may have an important role in the process of recovery and should probably not be underestimated. Studies have demonstrated that a substantial percentage (20-70%) of patients in western-style drug trials responds positively to placebo treatment, and that the positive response is based on patients' expectation to recover. Studies have also shown that this expectation can be enhanced by an effective doctor's performance. Results of placebo research and studies on the quality of doctor-patient encounters may thus lead to a re-evaluation of performance elements in the practice of evidence-based medicine and to the introduction of systematic performance training into medical education in the future. While it is highly likely that the performance elements and style found to be optimal in modern clinics and hospitals would be different from those used in traditional healing, the goals and underlying principles are likely similar.

Aims

The aim of this research was to extract performance principles of traditional healing and to examine their potential application, with necessary modifications, to evidence-based medicine in order to improve outcome.

Main contribution

This presentation will consider physicians' performance and interpersonal skills as integral to the practice of medicine.

Implications

Through this research, it is hoped that learning to effectively employ performance techniques in the practice of medicine may restore an important component that has been in decline in physicians' training and practice since the middle of the twentieth century.

Keywords

healing; shamanism; placebo; doctor-patient encounters; medical education

THE EFFECTS OF EARLY BREAK TASKS AND MUSIC TRAINING ON THE ACQUISITION AND CONSOLIDATION OF SIMPLE MOTOR SKILLS

Robert A. Duke¹, Amy L. Simmons^{1}, Sarah E. Allen², and Carla D. Cash³*

¹ Center for Music Learning, Sarah and Ernest Butler School of Music, University of Texas at Austin, USA

² Meadows School of the Arts, Southern Methodist University, USA

³ School of Music, Texas Tech University, USA

* Correspondence: asimmons@austin.utexas.edu

Background

Skill learning, a central component of music making, relies on both active practice and rest. It is well understood that the stabilization and refinement of newly acquired procedural memories may continue subconsciously long after active practice has ended. The process of memory consolidation not only stabilizes memories in the hours following initial practice but may also enhance memories during sleep, resulting in observable performance gains without additional practice.

Over the last nine years, we have demonstrated sleep-based performance enhancements among musicians and non-musicians and have reported on various aspects of the consolidation process in music, including learning multiple new skills in one session, listening to a recorded model, taking breaks during practice, and the introduction of related and nonrelated tasks during learning.

Here we continue to examine the effects of interposing brief rest periods early in the learning of a keyboard sequence. Our previous results, consistent with extant research in psychology, indicated that brief rest intervals interposed early in practice boost subsequent performance. But it remains unclear how the content of early rest breaks affects the memory processes that underlie these immediate performance boosts.

Aims

Our aim in this study was first to replicate earlier investigations in which early rest intervals in practice sessions advantaged skill acquisition and to determine whether the observed advantage of early rest is a result of time away from the target task or time away from focused attentional demands. A secondary aim was to determine whether music training affects the time course of learning sequential motor tasks.

Method

118 participants learned a five-element sequence on a piano keyboard with their non-dominant hand during individual evening training sessions comprising 12 30-second practice blocks. After their third block of practice, participants either (1) practiced a second five-element sequence for five minutes (motor task), (2) memorized a series of word pairs (declarative memory task), (3) took a five-minute break during which they talked with the proctor (talk), or (4) continued to the fourth practice block without a five-minute break (control). The following morning, all participants returned, approximately 12 hours post-training, for a test session consisting of three blocks of practice. Musical Instrument Digital Interface (MIDI) data for all performances were recorded using Max/MSP software.

Results

Musicians performed significantly more correct keypresses per block (CKP/B) than did nonmusicians across all timepoints, and were not significantly affected by the break conditions. Nonmusicians, however, demonstrated greater percentage gains than did musicians following the five-minute break and overnight, and comparisons of treatment groups revealed that nonmusicians in the Break-talk group made significantly greater gains over the five-minute break interval than did nonmusicians in both the Break-motor and No-break groups.

Conclusions

We found that nonmusicians were differentially affected by break condition; participants who memorized word pairs or talked with the proctor showed greater improvement over the rest interval than did those who practiced a competing motor task and those who continued without a rest. Musicians' performances were superior to nonmusicians' in all conditions, and we found no significant differences among the musicians' CKP/B attributable to rest condition.

Keywords

motor skills; memory consolidation; music; sleep; performance

FOUNDATIONS OF INTERVENTIONAL RESEARCH IN INSTRUMENTAL PRACTICE OF MUSIC: A CASE STUDY INVESTIGATING DETERMINANTS OF FUNCTIONAL SOURCES FOR THE CONSTRUCTION OF PSYCHOLOGICAL SKILLS INTERVENTIONS FOR MUSIC STUDENTS

Johannes Lunde Hatfield^{1*}

¹ Norwegian Academy of Music, Norway

* Correspondence: johannes.l.hatfield@nmh.no

Background

The present study is part of a larger interdisciplinary research project conducted by The Norwegian Academy of Music in collaboration with The Norwegian School of Sport Science. The present study is the first of three studies in the research project. A two-month psychological skills intervention was provided to a violist and a harpist recruited from the Bachelor program in music performance at the Academy.

Aims

The study's scope was to gain knowledge about constructing mental training programs for performing music students. Components such as iPads, electronic practice journals, performance profiling, group and individual meetings, different inter-communicative components such as styles of instruction, and ways of exploring one's own practice were the main constituents on trial.

Method

The present research was an instrumental collective case study through which two performing music students undertook a two-month psychological skills intervention program. Data were collected through semi-structured interviews, observations, and research logs.

Results

Findings suggested that the participants' personal interest and engagement in the theme constituted a basic determinant of motivation. Further data revealed that participants being self-referentially provided with a rationale for engaging in self-enhancing techniques were generally motivated for initiating psychological skills training. This study provided students with performance profiling, which turned out to be a substantial source of motivation. The study also revealed electronic practice journals and iPads to be adequate tools for the participants' enhancement of instrumental practice. In addition, the study found group discussions, in combination with individual work, to be an excellent way of organizing interventions. Finally, the implementation of psychological skills turned out to be best received by participants when altering between a determined instructional style of communication and open-ended communication generating free association among the participants.

Conclusions

This study sought to be a starting point and inspiration to further interest in developing a robust methodology of instrumental practice. This includes further action-like research within the sphere of music performance and practice, openness towards interdisciplinary work, and interest towards alternative ways of realistically organizing instrumental practice in the modern music conservatory.

Keywords

instrumental practice; psychological skills training; intervention; implementation; sports psychology

NEGOTIATING AMBIGUITY: DYNAMIC STRUCTURE IN SCHOENBERG SONGS

Vanessa Hawes^{1*}

¹ School of Music and Performing Arts, Canterbury Christ Church University, UK

* Correspondence: vanessa.hawes@canterbury.ac.uk

Background

Schoenberg's *Das Buch der Hängenden Gärten* (1909) has been the subject of many analytical treatments. Work has focused on the relationship between words and music and on the (a)tonal language. Underpinning both of these his-

torically/philosophically important themes is the ambiguous structure of the songs. Developing an understanding of structure is one way in which a framework is provided for learning music preparation for performance.

How do performers negotiate ambiguous structure in the learning process? Which musical features are important in making decisions about structure? How does a performer's understanding of structure change through exposure? How could understanding structure as dynamic contribute to strategies for performing?

Aims

The aim here was to present empirical evidence for structure as a dynamic process in two of Schoenberg's songs, examining reasons behind perception of different structural patterns. This evidence formed the basis for conclusions that could help performers negotiate ambiguous structure in practice and develop effective personal interpretations of the songs.

Method

Three empirical studies were carried out. First, a longitudinal case study involving a singer learning and performing Songs IV and V from *Das Buch der Hängenden Gärten*. The singer's evolving understanding of the structures of the songs was tracked through score marking and interviews. Second, a group of participants divided the score of Song IV into sections, with one group (n=13) listening to a recording and another group (n=13) silently studying the score before dividing it a second time. Questionnaire data were gathered about the importance of different musical features when making decisions about structure and climax. Third, a larger group of participants (n=60) divided and answered questions about Song V. In this experiment, all participants saw the score and then heard the song.

Results

In the case study, the singer's understanding of structure became more detailed as her familiarity with the songs increased. Different categories of sections were identified according to function: rehearsing and preparation (e.g. difficulty, relationship with pianist) and then for expression (e.g. "shaping" the vocal line for performance). Different musical features defined different structural change points at different stages of the process. An increase in complexity in structural understanding was also shown in the group studies. The variety of different structural patterns identified increased after exposure to the aural stimulus, as did the relative importance of different musical features, indicating different functions for different musical features commensurate with existing work on performance cues.

Conclusions

Structure in these songs is dynamic, subject to the same interpretative processes as expression in performance. Ongoing exposure to the visual (score) and aural (recording) stimulus changed performers' perception of structure, specifically in response to function. Awareness, early in the learning and preparation process, of the way different musical features shape different perceptions of structure may help performers negotiate creative and personal interpretations of structure. Moreover, listening to existing performances early in the learning process did not restrict the possibilities for developing a personal interpretation of structure. Exposure to the heard music increased the number of possible interpretations of structure in these songs.

Keywords

performance; structure; analysis; interpretation; atonality

ROTATING THE GROOVE: PARTICIPATORY DISCREPANCIES WITH VARIED PERSONNEL IN JAZZ TRIO PERFORMANCE

Alex Hofmann^{1,2*}, Brian Wesolowski³, and Werner Goebel^{1,2}

¹Austrian Research Institute for Artificial Intelligence (OFAI), Austria

² Institute of Music Acoustics, University of Music and Performing Arts Vienna, Austria

³ Department of Music, University of Georgia, USA

* Correspondence: hofmann-alex@mdw.ac.at

Background

In popular music, the quality of a performance is often judged by its groove. As easy as it may seem to decide for a listener on what is "groovy" or not, it is difficult to identify technical characteristics of groove in a performance. Even though solo performances can be groovy by themselves, another theory refers to systematic delays between bass and drums in the rhythm section to be a relevant feature of groove ("participatory discrepancies"). How do particular combinations of players create a certain level of groove? What is the influence of one player on the group's groove?

Aims

The purpose of this study was to investigate characteristic parameters of jazz expression and cognitive processes underscoring joint action in improvised, groove-based (i.e. jazz) musical performances.

Method

Professional, American jazz musicians (two bassists, three drummers, one saxophonist) participated in the study. Players were organized into six possible combinations of a jazz ensemble. Each ensemble was asked to improvise twice over the form of a popular jazz tune: *Have You Met Miss Jones* (medium swing; 168 BPM). The tempo was introduced at the beginning of each trial by a metronome. We used a MIDI-Drumkit, an Electric Double Bass, and a saxophone microphone to monitor individual performances. The multi-track signals were recorded with Ableton Live 9.1 Software (A/D, Focusrite, 48 kHz, 24 Bit) onto computer hard disk. Pitch, onset time, and offset time were automatically extracted using the Ableton Software. Time values were directly imported into R-statistics. The timing error (relative deviation from the introduced tempo in percent) for each performance was calculated. Cymbal hits falling on the same bar count with bass notes were identified. Participatory Discrepancies (PDs) between drummer and bassist were calculated by subtracting bass note onsets from cymbal hits.

Results

We observed that all ensemble combinations showed the trend of playing too fast (timing error: $M=-10.4\%$, $SD=2.6$). It was more the case with bassist 2 ($M=-11.8\%$), than with bassist 1 ($M=-9.0\%$). Furthermore, there was a significant influence of the drummers on the PDs of the performances. Drummers 1 and 2 played laid back in relation the bassists ($M=9.5\text{ms}$, $SD=2.0$), while drummer 3 was almost synchronous with both bassists ($M=-0.3\text{ms}$, $SD=2.0$). We also observed an effect of bassist on the PDs in all ensemble combinations. Bassist 1 showed the tendency to play ahead of the drums ($M=8.1\text{ms}$), in comparison to bassist 2 who used smaller PDs in general ($M=3.9\text{ms}$).

Conclusions

This first look into our dataset examined relative timing among the ensemble members when performing in different player combinations. Bassists had a dominant influence on timing error, while the drummers seemed to control the PD of the performances. In future research, we plan to investigate more performance parameters, e.g. offset timing, articulation, dynamics, and the sound, in order to correlate these parameters with listeners' groove-ratings.

Keywords

jazz; groove; beat; ensemble; timing

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PERFORMING MATTERS: DOCUMENTING THE EFFECT OF MUSICAL PERFORMANCE USING THE CONTINUOUS RESPONSE DIGITAL INTERFACE

Andrew H. Homburg^{1*}

¹ Department of Music, Missouri State University, USA

* Correspondence: andrewhomburg@missouristate.edu

Background

The Continuous Response Digital Interface (CRDI) is a potentiometer which, when attached to a computer, can continually measure and record a subject's response across time. One advantage of the CRDI is the subject responds by turning a dial; a task easily done while the subject remains attentive to the stimulus. Thus, the CRDI has been in use as a tool for wide varieties of music research for nearly 25 years. Review of recent literature reveals the CRDI continues to be an effective tool to for music research.

Aims

Some studies highlight the effectiveness of the CRDI in documenting the effect of musical performance on the performer's subsequent response to music. One such study compares aesthetic response between pieces performed and pieces never performed by US high school students. Months after the performance, the performers' aesthetic response to a professional recording of the pieces performed was compared to their response to recordings of pieces they had not performed. Findings and implications are discussed and analyzed.

Another such study used the CRDI to measure a range of response in US elementary music students. Students in grades 4 through 6 listened to and recorded their aesthetic response to three pieces of music: a pop song, an opera aria, and a recording of a piece only some of the students had performed. A range of response using the first two pieces was established for every student. Analysis of response to the third piece in relation to the first two was completed for each student, and trends between performers and non-performers are discussed.

Main contribution

The CRDI continues to be an exciting and relevant research tool. The versatility and validity of the instrument are furthered by recent research. Analyzing CRDI data in new and creative ways can document possible benefits of musical performance.

Implications

This in-depth review of literature and current research practice reveals exciting and relevant findings. Performing music may alter performers' future responses to music. Even if the duration or degree of the alteration remains unclear, another benefit of musical performance could be documented. Further research is needed to examine possible lasting effects of performing music on performers' subsequent response to music.

Keywords

Continuous Response Digital Interface; music performance; aesthetic response; musical preference; music instruction

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REAL MEN SING: UNDERSTANDING MALE SELF-EFFICACY AND THE CHOICE TO PARTICIPATE IN VOCAL MUSIC

Andrew H. Homburg¹ and Mark E. Lucas²*

¹ Department of Music, Missouri State University, USA

² Department of Music, Bethany College, USA

* Correspondence: andrewhomburg@missouristate.edu

Background

Generally speaking, choirs in United States public schools continue to experience lower male enrollment than female enrollment. Certain places and locations within the United States and abroad do not experience this phenomenon of singing not being chosen by men. Dissecting, evaluating, and categorizing the current literature for factors which lead to increased male participation in performance ensembles is an essential first step to equalizing enrollment, and balancing performance ensembles. One factor increasingly present in the related music literature is self-efficacy: a belief in one's ability to succeed in a situation.

Aims

Teachers of music have long employed various means to increase male and female students' self-efficacy. Examination of the available research can be confounding: most methods that seem to work are explained as contextual, and therefore cannot be universally employed. More research, perhaps on shared common musical experiences seems to be needed, to see which methods work best across certain populations or genders.

Recent research in the area of male musical self-efficacy may strengthen its position as the most relevant factor. Upon review and consideration, many influences lead to an individual male's choice to participate: support from home, support from peers, music teacher influence, and experiences to name a very few. Each of the aforementioned influences, in an anecdotal if not empirical way, can be explained as increasing the individual's self-efficacy. One study examined the effect of a male focused singing workshop on the self-efficacy of its participants. More than 350 males from many area schools were gathered for a day-long workshop on performance at an area college. Participants were ten to eighteen years old. No audition was required for the festival, only teacher permission or selection. All participants were twice surveyed using a Music Performance Self-Efficacy Scale: once before the day's activities, and once after them. Returned surveys were analyzed for any possible changes. Results and implications are discussed.

Main contribution

By understanding self-efficacy, we see its true nature and influence on males and their participation in vocal music. Recent research has begun to highlight the degree to which self-efficacy is fluid in males, and the need for more performance experiences for researchers to examine.

Implications

Experiences in music that can be shown to increase self-efficacy in male music students have the potential to equalize the gender imbalance found in performance ensembles. The need for further research into factors that contribute to male participation in vocal music is compulsory.

Keywords

self-efficacy; music performance; male identity; choir; music instruction

WHAT ATTRACTS AN AUDIENCE'S VISUAL ATTENTION? AN EYE TRACKING STUDY

Satoshi Kawase^{1} and Satoshi Obata²*

¹ Department of Music, Soai University, Japan

² Department of Human Media Systems, University of Electro-Communications, Japan

* Correspondence: satoshiyawase.psy@gmail.com

Background

Many studies have indicated that visual information such as body movement or facial expressions significantly influence an audience's perception of a musical performance. However, despite its significance in daily communication, gaze in performer-audience interactions during musical performances has seldom been explored, and therefore, little quantitative data regarding audience gaze is available.

Aims

This study employed a non-invasive eye tracker to investigate two hypotheses focusing on the fundamental functions of gaze, namely direction and attention attraction: (1) the audience's gaze depends on the musical structures (melody or accompaniment); and (2) the shifting of a performer's gaze toward a co-performer attracts the audience's visual attention. Each hypothesis was developed based on two rationales. First, given that melody is often perceived as leading, it may attract the audience's visual as well as auditory attention. Second, according to the "joint-attention" paradigm, in daily communication, a person's gaze direction alters other people's attention. Therefore, this phenomenon could be observed in performer-audience interactions.

Method

To generate the six audio-visual stimuli, a female vocal duo's singing was recorded that included both melody and accompaniment. The performers' gaze conditions were manipulated in the following manner: 3 gaze conditions (an unreciprocated gaze from each performer and an absence of eye contact) × 2 musical conditions (melody or accompaniment). In the all-stimuli condition, the singers exchanged parts at the middle of the song. Under the unreciprocated gaze condition, at the moment they changed parts, the singer looked once toward the co-performer for approximately two seconds. 29 college students (12 males and 17 females) participated in the experiment. The stimuli were presented randomly to each participant using a display and two loudspeakers, and each participant's gaze point was recorded on the display using a non-invasive eye-tracker. Each participant's gaze point coordinates on the monitor were analyzed.

Results

The analysis of the participants' gaze direction revealed that they were inclined to look toward the singer assigned the melody regardless of any shift in the performers' gaze directions, although results for only three of the six stimuli were statistically significant. The participants' gaze toward the singer assigned the melody was found to be concentrated on specific parts of the song, such as when the pitch of the melody rose, rather than on the whole song. In contrast, under the unreciprocated gaze condition, joint attention between performers and audience members was observed. When a performer's gaze shifted, the participants initially directed their gaze toward the singer looking at the co-performer, and then directed their gaze toward the co-performer receiving the gaze.

Conclusions

The principal findings are the following: (1) participants directed their gaze toward the performer singing the melody, particularly when the melody was salient; and (2) the performers' gaze attracted the participants' visual attention.

Keywords

gaze; eye tracking; joint attention; audience; audio-visual

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INTRODUCTION TO ARTS CONTENT LEARNING IN A DISTANCE LEARNING EDUCATION COURSE

Dorotéa Kerr^{1*} and Any Raquel Carvalho²

¹ Department of Music, Paulista State University *Júlio de Mesquita Filho*, Brazil

² Graduate Music Program, Federal University of Rio Grande do Sul, Brazil

* Correspondence: dkerr@uol.com.br

Background

The word “performance” is understood in this text not in its most common sense related to some artistic performance, but as the execution of a function or activity performed in a formal way. This text presents the ideas and results of research intended to develop a learning process in arts for undergraduate students in a distance learning Education course, organized for Fine Arts, Dance, Music, and Theatre. This course was taught by a virtual university in Brazil for the expansion of public higher education. The target audience was teachers of Basic Education in the municipal/state public network and will be treated as teacher-students. In the Brazilian educational system, these teachers are considered “generalist” teachers, responsible for the transmission of the full content of the subjects indicated for that level.

Aims

The course was designed around two intellectual/behavioral objectives and one utility purpose. The first led the teacher-students to immerse in the world of Arts, transitioning among the multitude of aesthetic manifestations and historical concepts of art that one can appreciate today. The second intellectual/behavioral objective aimed to encourage recognition of the value of ideas in artistic creation; to find out how artistic movements were deployed from ideas that leveraged new creations, brought original practices, and altered aesthetic conceptions. The practical objective was to encourage and expand the use of internet resources. The use of these facilities may permit moving to other realities, unveiling objects, observing attitudes, and witnessing creations and results distant from our day-to-day routine.

Method

The course was developed over one month in two live classroom lessons per week and the study and development of the activities were virtual. The materials used included: *Notes on forming Teachers–Pedagogy in Arts*, including eight printed articles and activities; six TV programs; interactive programs; and the *Edutec Portal*, a web platform for communication between authors and teacher-students.

Results

Written texts by the teacher-students showed unfamiliarity with the personal immersion as the first goal revealed difficulties, and even refusal to follow directions, justifying the common practice of group study as a way of “socialization of knowledge.” Others manifested the failure of the expectation that the course would provide “recipes” on what to do in an art class, distant from the proposed goals to leave behind the prescriptive lessons which hinder curiosity. The authors of the *Notes* observed that teacher-students' expectations were frustrated and the definitive definitions of what the Arts consist of was denied.

Conclusions

This research intended to create a formal way of dealing with the Arts within a distance learning course. It proved instructive for the authors of *Notes* because it showed difficulties in, or absence of, interest related to the formation of the teacher-students. The greatest difficulty was to accept the particular notion of immersion and allow oneself to create one's own artistic framework.

Keywords

distance learning course; undergraduate students; teacher-student; learning performance; arts distance learning course material

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MEASUREMENT OF VIBRATION ON FOREHEADS OF SOPRANO SINGERS DURING SINGING

Tatsuya Kitamura^{1} and Keisuke Ohtani²*

¹ Faculty of Intelligence and Informatics, Konan University, Japan

² Faculty of Education, Nara University of Education, Japan

* Correspondence: t-kitamu@konan-u.ac.jp

Background

Female singing voices are generally divided into three vocal registers—modal, mixed, and falsetto registers—based on the range of tones. The modal register is the lower register and falsetto register is the higher register. When a singer sings in falsetto register, she experiences self-generated voice functioning at the top of, or inside, her head. Miller, a famous vocal coach, described “When the spectral balance is complete, a singer is aware of sensations in bony structures of the head that are quite different from those of imbalanced phonation.”

Aims

If sympathetic or vibratory sensations result from the vibration of the bony structures and the body tissue of the head, the skin surface of the head could vibrate during singing in the falsetto register. It seems likely that the vibration related to these sensations could be used to evaluate the phonatory states and/or the singing skills of singers. These vibrations might also be used as feedback for reducing the influence of environmental acoustical noise in singing practice. Therefore, in the present study, we examined the vibration of the forehead of singers who were singing in modal and falsetto registers.

Method

The vibration velocities of the forehead surface generated by modal and falsetto voicings were examined for three professional soprano singers. A scanning laser-Doppler vibrometer (Polytec PSV-500) was used to acquire the vibration velocity of the forehead. The vibrometer allows noncontact measurement and can scan and probe multiple measurement points automatically. The participants were asked to sing the Japanese vowels /a/ and /i/ at four pitch frequencies in a supine body position, and the vibration velocities of 10 points on the forehead were measured and averaged. The measurement points were standardized considering the vertical size of the forehead of each participant. The participants sang in their modal voice for the lowest pitch frequency and in their falsetto voice for the other frequencies.

Results

The results of the measurements revealed the following:

- (1) The mean vibration velocity was larger for the head voices than for the chest voices. However, the difference in the vibration velocity between the chest and head voices exhibited individual variability.
- (2) In most cases, the vibration velocity was not correlated with the pitch height or the mean equivalent noise level (LAeq).
- (3) The vibration velocity did not vary between the front and back vowels.

Conclusions

We observed the vibration velocity of the skin surface of the forehead during singing. Measurements were carried out for three professional soprano singers using the scanning laser-Doppler vibrometer. Although the number of participants was inadequate to form a definitive conclusion, the vibration of the forehead did not exhibit a clear relationship with the voice register or the vibratory sensation of the singers. Miller noted that “Sensations from singing vary widely from individual to individual, because sympathetic vibration from self-generated sound sources are not uniform.” At least for the forehead vibration, the results of the present study support this statement.

Keywords

vibration of forehead; soprano singer; register; laser-Doppler vibrometer; sympathetic sensation

Acknowledgments

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MEMORIZING MUSICAL SCORE PROCESSES DURING PIANO AND GUITAR PERFORMANCE: AN EYE MOVEMENT STUDY

*Satoshi Kobori*¹*

¹ Department of Electronics and Informatics, Ryukoku University, Japan

* Correspondence: kobori@rins.ryukoku.ac.jp

Background

Music performance has been studied widely using various methods. However, there have been few studies on eye movements in music reading, though eye movement data gives us good evidence regarding information processing in music performance.

Aims

The purpose of this study was to clarify the cognitive processes involved in reading and memorizing musical scores during music performance by tracking eye movement.

Method

A music memorizing experiment was conducted. The experimental apparatus consisted of a music recording system and an eye tracking system. In the experiment, subjects were required to remember a musical score presented on a computer screen, then to perform the melody from memory after the score disappeared.

The parameters of the experimental condition were the difficulty of the music (A=easy melody and B=complex melody) and memorizing time (15, 30, and 45 seconds). 12 pianists and six guitarists participated.

The fixation rates were calculated from eye movement data, and the recall rates were calculated from performance data. These evaluation data were analyzed using a mixed ANOVA with instrument (between subjects), difficulty of the music, memorizing time, trial number, and bar number (within subjects) as factors.

Results

Regarding both the fixation rate and the recall rate, the main effects of difficulty and memorizing time were significant, meaning the processes of reading and memorizing were influenced by the difficulty of the music and memorizing time. However, since the interaction between difficulty and bar number was significant regarding the fixation rate, where on the score subjects read was affected only by difficulty, and since the interactions between difficulty and bar number, and between memorizing time and bar number, were significant regarding the recall rate, what subjects remembered was affected by both difficulty and memorizing time.

Regarding the fixation rate, the main effect of instrument was not significant, but the interaction between instrument and bar number was significant. Regarding the recall rate, the main effect of instrument was significant, as was the interactions between instrument and difficulty, between instrument and trial number, and between instrument and bar number. These means that the bar numbers to read, influence of difficulty, and bar numbers to memorize were different between the two instrument groups. These differences may have been caused not by instrument differences but rather by overall experience, since the pianists had studied much longer than the guitarists.

Conclusions

Using eye movement data and performance data, the factors which affect the processes of reading and memorizing musical scores were examined in this study. The results suggested that the interaction between perception, memory, and motor skills is crucial for music performance.

Keywords

eye movement; memory; cognitive process; piano; guitar

A COMPARISON OF PERFORMANCE MOTION RELATED TO EMOTIONAL VALENCE BETWEEN GRAND PIANO AND KEYBOARD PLAYING

Yuki Mito^{1}, Hiroshi Kawakami¹, Masanobu Miura², and Yukitaka Shinoda³*

¹ College of Art, Nihon University, Japan

² Faculty of Science and Technology, Ryukoku University, Japan

³ College of Science and Technology, Nihon University, Japan

* Correspondence: mito.yuuki@nihon-u.ac.jp

Background

We examined motion related to emotional expression in keyboard instrument performance. In a previous study, we examined the performance motion of five emotions, and an emotionless performance, of a professional pianist using a motion capture system.

Aims

In a previous study, we only examined the motion of a performer playing a keyboard. In this study, we aimed to compare motion while playing a keyboard to that while playing a grand piano.

Method

The subject was a professional pianist. Performance motion was measured using a motion capture system while the pianist played a keyboard and a grand piano. The pianist performed a melody while expressing one of five emotions (happiness, tenderness, anger, sadness, fear) used by Juslin, as well as an emotionless performance. He performed the same melody with both hands. We compared the width of motion fluctuation and the center of gravity of the upper body.

Results

We calculated the differences (Δx , Δy , Δz) and standard deviations of each axis between maximum and minimum positions of the center of gravity of the upper body in three-dimensional space. Performance motions of the grand piano performances were found to be smaller than those on the keyboard.

Conclusions

As motion during the grand piano performances were smaller than on the keyboard, we thought that expression was difficult to achieve because of the flat touch of the keyboard. Thus, we found pianist changed his performance motion based on the musical instrument.

Keywords

motion capture system; grand piano; keyboard; expression of motion; motion analysis

RESONANCE OF MIMICRY: MEDIA ARTISTIC APPROACHES TO BODY IMAGE OF DEVELOPMENTAL DISORDER

Taisuke Murakami^{1}*

¹ Department of Design, Aichi Sangyo University, Japan

* Correspondence: taisum@asu.ac.jp

Background

In this study, we discuss our body image through the study of developmental disorder (mainly autistic spectrum disorders). Autism is a disorder of interpersonal interaction. Interpersonal interaction is a foundational social ability and deeply related to the development of imitative abilities. In typical development it is considered that some imitation abilities could be innate, according to study cases in such areas as neonatal imitation and mirror neuron systems. On the other hand, autism patients face difficulty in imitation and sensory integration becomes a problem with an unstable self-body image in such situations.

Aims

Autism patients possibly acquire unique body images by developing imitation without relying on interpersonal interaction. In this study, we aimed to establish a completely different body image model through the research of imitation observed in autistic art activities. The study subject was an improvised dance session by a Java dancer and an autistic adult male at a welfare facility. From the study of this dance session, we aimed to describe, with motion anal-

ysis, how a body image created by different sensory integrations with the dancer and autistic adult male obtained consistency as integration and separation through symmetric properties.

Main contribution

Although autism is a functional disability of the brain without permanent cure thus far, the patients often need to be adaptable to society even with problems of interpersonal interaction. Furthermore, it might be hard to understand the difficulties of autism from an external viewpoint. By examining a situation where autism and typical development could be creatively involved through a dance session at welfare facility, we aimed to establish a mutually shared body image. As this is was cross-sectional study for various fields including medical services, welfare services, and arts, it could provide a completely different body image for each field.

Implications

Autism holds an ambiguous border with typical development, and such borders can be connected with various continuities. With this research, we advanced our study with a focus on body images made different from typical development by the instability of sensory integration that accompanies autism. Body image should be spectrum wavering between autism and typical development, but it must be a sharable body image even though both have a different nature. It is considered that such a body image would be not only useful to understand autism, but would also renew an existing body image of typical development.

Keywords

autistic spectrum disorders; design of empathy; inclusive education; dance session; media art

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INVESTIGATION OF FACTORS OF AMBIGUITY IN TEMPO PERCEPTION USING MUSICAL VARIATIONS

Sota Okada^{1} and Masanobu Miura²*

¹ Graduate School of Science and Technology, Ryukoku University, Japan

² Faculty of Science and Technology, Ryukoku University, Japan

* Correspondence: xkre3x@gmail.com

Background

The phenomenon by which people perceive the speed of a tune is called tempo perception. Although previous studies have reported that ambiguity exists in tempo perception, the factors contributing to this ambiguity have not yet been investigated.

Aims

The ambiguity of tempo perception is categorized into three types: tempo deviation ambiguity, interpersonal ambiguity, and individual ambiguity. This paper investigated the last two.

Method

This paper investigated whether the number of notes, timing of notes, and combinational effect of melody and accompaniment are possible factors of the ambiguity of tempo perception. This paper conducted a listening experiment using variations of the Disney song *Let It Go*, where arranged melodies and arranged accompaniments of the music were used as stimuli. Commercially available sheet music was used to obtain the song's original melody and chord progressions. Five melodies were used: one original and four arranged, composed with more or fewer notes than the original. Additionally, the five accompaniments involved different rhythmic arrangements over the original chord progression. Twenty-five variations (five melodies with five accompaniments) were used. Our experiment used 125 stimuli (25 variations, each with five click sound sequences of 17, 34, 68, 136, or 272 BPM). Click sounds were provided with beat positions on each variation. Ten subjects listened to a variation and decided whether the speed of the variation accorded with the speed of the click sound sequence. Tempo evaluation values were then calculated.

Results

The 10 subjects were classified into high interpersonal ambiguity (five people) and low interpersonal ambiguity (five people) groups using their answers. The average number of answers for each variation was calculated using only the people of high interpersonal ambiguity. When the average was higher than 3, the variation in question was provisionally considered to have higher ambiguity. Accordingly, the interpersonal ambiguity of 10 out of 25 variations was considered as higher. The higher variations were characterized by the existence of remarkable sounds, or accent, on beat positions. That is, if the density of accents synchronized to beats was the same level as beats themselves, the interpersonal ambiguity was higher.

This paper investigated factors of individual ambiguity by calculating the standard deviation of the tempo evaluation values. The F-test was conducted between the variation with the highest standard deviation and the other variations. There were significant differences at 5% significance level in 20 out of 24 patterns. The characteristics of the variation clarified that when more pronunciations of melodic notes were observed and/or the periodicity of accents was not aligned to the period of the beats, individual ambiguity was higher.

Conclusions

When the density of accents synchronized to beats was the same level as those of beats, interpersonal ambiguity was higher. Furthermore, when more pronunciations were observed and/or the periodicity of accents was not aligned to the period of the beats, individual ambiguity was higher.

Keywords

interpersonal ambiguity; individual ambiguity; listening experiment; melody; accompaniment

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THE WAY OF SINGING: THE DIONYSIAN AND THE APOLLONIAN IN THE LEARNING PROCESS

*Maria Yuka de Almeida Prado**

¹ Department of Music, Faculty of Philosophy, Sciences and Letters at Ribeirão Preto, University of São Paulo, Brazil

* Correspondence: yuka@usp.br

Background

To follow the impulses, to live intensely, to opt for sensuality, to enjoy being lazy, to only seek pleasure... these are some of modernity's precepts. Singing is taken as leisure, as something to be enjoyed. However, the systematic study of singing, consisting in the construction of both the instrument and the instrumentalist, requires overcoming this hedonistic conception of freedom. Strict discipline grounded in a culture of self-sacrifice, inspired as a *Way* to be endeavored, is fundamental in order to achieve excellence in singing performance. Eastern tradition here has much to contribute to this discussion. The coexistence of binary positions is intrinsic to the art of singing. Discipline enhances pleasure into higher levels, purifying it for the musical exercise.

Aims

The aim of this research was to indicate a way in which apparent opposites coexist: the pleasure of singing with the discipline required for musical performance; the Dionysian and the Apollonian; Eastern and Western cultures.

Main contribution

In the later 80s I sought to delve into deeper specificities and constants required for the formation of a professional musician. This led me to a fusion of horizons, of inner and outer worlds, of reason and emotions, of analysis and performance, of East and West. In the study of singing, both physical and psychological wellness are absolutely fundamental inasmuch as voice is the full-fledged expression of being: it is the soul's intimate portrait, the projection of the inner voice's desires and fantasies driven by pulsions. These have to be assimilated into the execution of the work of art. Therefore, rigorous discipline is essential so that one may observe the storms inherent to human nature, and then become master of the impulses so as to follow the way without erring.

Implications

The culture of self-sacrifice is hard to be assimilated yet absolutely necessary for the performance of singing. It should emerge as a counterpoint to contemporary society's education tainted by hedonism, individualism and narcissism. One could even affirm that the way of learning is timeless, not limited by space or culture. With the Dionysian

and the Apollonian harmonized, with the synesthetic correspondence between the senses of both instrument and the instrumentalist established, transcendence reveals itself as excellence in vocal education.

Keywords

vocal education; vocal performance; singing; Dionysian and Apollonian; East and West

THE USE OF SOCIAL MEDIA, REALITY TV, AND POP CULTURE IN TRAINING CHARACTER DEVELOPMENT IN YOUNG OPERA SINGERS

Jamie Reimer^{1*}

¹ Glenn Korff School of Music, University of Nebraska–Lincoln, USA

* Correspondence: jreimer2@unl.edu

Background

The advent of reality television and social media has created a culture of instantaneous information and unfiltered communication in modern society. Student immersion in these phenomena result in classrooms filled with limited attention spans, historical detachment, and disdain for traditional lecture style teaching. Singers are often asked to understand historical and cultural information from the perspective of characters with very different life situations from those the singer himself has experienced. While traditional approaches to translation, source material research, and character development are proven, useful, and necessary, students also respond well to the media and technology they experience in their daily lives.

Aims

The research aimed to prove that the use of pop culture, such as reality television, and social media, such as Twitter and YouTube, provide a cultural connection between operatic characters and developing singers that results in a more fully developed dramatic performance.

Method

Students produced short videos, blogs, and Twitter feeds based on the source material and historical research they had conducted. The format and intent of each assignment was clearly defined.

Students were evaluated on the format and content of each assignment. Students also completed a variety of assessment surveys to reflect on their learning as a result of these assignments.

Results

The hands-on nature of this method, coupled with modern media with which the students were already comfortable, allowed a natural learning process that translated into a deeper understanding of the character as a whole. Students were more satisfied with their learning outcomes and final performances.

Conclusions

While traditional methods of character research and development—such as the reading of source material, historical discovery, and traditional theatrical methods—are necessary and useful, the changing nature of students' comfort and attention levels requires innovative teaching methods. The use of pop culture and social media in character development allowed the singers to break through the historical and cultural boundaries of their characters to discover and explore the authentic humanity in their performances.

Keywords

opera; media; singer; culture; character

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AN ANALYSIS OF BREATH TIMING IN PIANO PLAYING

Yutaka Sakaguchi^{1*} and Eriko Aiba¹

¹ Graduate School of Information Systems, University of Electro-Communications, Japan

* Correspondence: sakaguchi@is.uec.ac.jp

Background

The nature of breathing during motor tasks has been mainly investigated from the viewpoint of physiological respiration (e.g. oxygen uptake and energy metabolism). However, breathing must be closely related to motor behavior and mental activity even when it is controlled involuntarily. It is broadly accepted in the musical community that breath rhythm is tightly coupled with musical performance and expression. Nonetheless, the characteristics of breath rhythm have been little investigated.

Aims

The present study aimed to clarify how breath timing is determined in piano playing.

Method

The experiment was approved by the University of Electro-Communications Institutional Review Board for Human Subjects Research. Fifteen participants (professional and amateur pianists) played an electronic piano (Yamaha, hybrid piano N2) in a soundproof room, equipped with a CO₂ sensor (Nihon Koden, TG-920P) on their mouth and nose. Timings of expiration and inspiration were detected by the increase and decrease in the CO₂ partial pressure (i.e. capnograph), respectively. Participants played 10 short excerpts (0.5-2 minutes) extracted from various piano works (including Hanon, Bach, Mozart, Beethoven, Chopin, and Debussy). They repeated the same pieces at least five times with several-second intervals. The signal from the CO₂ sensor was collected by a PC together with the sound signal from the piano (with a sampling rate of 8 KHz). Sound signals were used to align the breath data from different trials: the temporal axes of the data were expanded/shrunk by the dynamic time warping method so that the sound spectrograms from different trials were matched to each other. We analyzed the breath timing and its consistency within and between participants.

Results

Although breath timing depended greatly on the pieces and participants, we found several characteristic features in the experimental data. First, breath intervals were never uniform within the pieces: they could vary continuously during the performance (even within several measures). The breath timing often reflected the segmental structure of the musical piece (e.g. participants generally breathed in just before starting new phrases). Second, the average length of breath intervals differed between the excerpts. The long/short relationship of the breath interval was partly shared among different participants. Third, the inter-trial consistency of breath timing depended on the participants. In particular, a few professional pianists kept a specific breath pattern even in playing a simple scale. Fourth, the magnitude of inter-trial consistency depended on the pieces and on the parts of the pieces. No participants showed consistent breath timings in the Hanon exercise. In some specific parts of other pieces, on the other hand, high inter-trial consistency was found in all participants. Interestingly, in some of such highly consistent parts, different pianists exhibited different breath patterns, presumably reflecting their own musical expression and interpretation.

Conclusions

Breath timing in piano playing was tightly coupled with the structure/segment of the musical works, as well as the musical expression of individual pianists. The fundamental reason for this coupling is an open question.

Keywords

breathing; piano playing; breath timing; inter-trial consistency; musical expression

Acknowledgments

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GUARNIERI'S *PONTEIO 45*: A COMPARISON OF TEMPO AND INTENSITY VARIATIONS BETWEEN PROFESSIONAL PIANISTS AND GRADUATE STUDENTS

Regina Antunes Teixeira dos Santos^{1*} and Cristina Capparelli Gerling¹

¹ Graduate Music Program, Federal University of Rio Grande do Sul, Brazil

* Correspondence: regina.teixeira@ufrgs.br

Background

Variations in tempo, intensity, timbre, and articulation constitute potentially expressive characteristics of performed music. Among skilled performers, these systematically employed expressive devices are related to the structural features of the music. The literature on the science of performance accounts for role of tempo and intensity manipulation in timing and consequently in expressive performance.

Aims

The present research aimed at investigating the role played by the choice of tempi and intensity adopted during the performance of a given piece containing repeated sections and internal tempo changes.

Method

Five professional pianists and five graduate students learned *Ponteio 45*, a short piano piece written by Brazilian composer Camargo Guarnieri (1907-1993). Its main characteristic concerns the alternation of two main sections as follows: $ABA^1B^1A^2B^2$, where A is 100 BPM for the quaver and B 80 BPM for the quaver. Sampling involved both performance recording and interviews. The audio files were analyzed with SonicVisualizer® and Wavosaur® softwares. Interviews were treated by content analysis. Short segments of section A and B were analyzed in terms of timing, note density, and intensity of note attack.

Results

Although results showed a general tendency to play section A faster and section B slower as requested by the composer, from the note density point of view graduate students were more restrained in the manipulation of tempo changes in comparison to the professional pianists. The oscillation of tempi between sections A and B marked a distinction between professional and students. Professionals presented clearer tempo differentiation by deviating from referential values (nominal performance). Strong correlations ($r=0.9989$) were observed by taking into account the attacks of the first ten notes in section A . In terms of the intensity (expressed in dB) of attack applied to the 10 first notes of sections A , A^1 , and A^2 , three patterns were identified within the investigated sample: (1) small variations of intensity between successive notes consistent with the score; (2) emphasis on highlighting the dynamic indications of the score; and (3) no clear manipulation of intensity resulting in absence of dynamic differentiation.

Conclusions

The indication of 100 BPM for the quaver at the A , A^1 , and A^2 sections was observed insofar as a general guideline, given the tendency to play A^1 and A^2 with noticeable tempo variations. As far as intensity was a parameter, there were no observable differences in the intensity applied to the performances in the two categories within the two groups in the sample.

Keywords

graduate students; professional pianists; piano performance; tempo; intensity

Acknowledgments

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THE RELATION BETWEEN A PUPPET'S ACTION AND PUPPETEER'S BREATHING PHASES IN BUNRAKU

Tomonori Shibuya^{1}, Yui Morita², Haruaki Fukuda³, Kazuhiro Ueda⁴, and Masato Sasaki⁵*

¹ Department of Art and Design, Meisei University, Japan

² NPO Association for Education of Japanese Traditional Performing Arts, Japan

³ Department of General System Studies, University of Tokyo, Japan

⁴ Interfaculty Initiative in Information Studies, University of Tokyo, Japan

⁵ Graduate School of Education, University of Tokyo, Japan

* Correspondence: tooshibu@gmail.com

Background

In Japanese traditional performing arts, “breathing” is said to be one of the most fundamental techniques. Recent studies suggest that breathing is not in synchronization with body action for experts in Kyogen and Kabuki, Japanese traditional performing arts. This result contrasts with the report that, with growing proficiency, breathing becomes synchronized with body action in sports and Western dances.

Aims

Bunraku, which is also one of the Japanese traditional performing arts, is a form of puppet theater in which three puppeteers cooperatively manoeuvre one puppet. Thus, Bunraku borrows different characteristics from both Kyogen and Kabuki; the body (puppet) that performs actions is different from the bodies (puppeteers) that control the actions. Therefore, in Bunraku, a relation between body actions and breathing could be different from that in Kyogen and Kabuki. The aim of this study was to clarify the relation between the puppet's action and puppeteer's breathing in Bunraku and to compare it with that found in Kyogen and Kabuki. If the result was similar to the case of Kyogen and Kabuki despite the difference in performing style, the breathing, which is not synchronized with body actions, would be a unique characteristic shared among Japanese traditional performing arts.

Method

Two Bunraku puppeteers who differed in career length (one puppeteer's career spanned 31 years while the other puppeteer's career spanned 13 years) participated in our experiment: We asked them to execute the following three tasks; the first task was to perform basic actions called “Kata” with a familiar puppet, the second was to perform the same basic actions with an unfamiliar puppet, and the third was to perform an actual Bunraku play to music by the shamisen and narration by Tayu. In order to clarify whether or not a puppeteer's breathing was in synchronization with his body actions, we investigated the correspondence between the puppet's movements and puppeteer's breathing phases as well as the periodicity of breathing by analyzing autocorrelation of breathing curves.

Results

First, the more experienced puppeteer's puppet motion synchronized with specific a breathing phase (inspiration or expiration) less frequently than the less experienced puppeteer. Second, in all tasks, the more experienced puppeteer showed more periodic and stable breathing patterns than the less experienced puppeteer. These results are consistent with the previous finding in Kyogen and Kabuki, suggesting that periodic and stable breathing is a common characteristic in Japanese traditional performing arts. On the other hand, it was found that the periodicity of breathing in an actual Bunraku play (third task) was clearly lower than the breathing in basic actions (the first and second tasks). This suggests that the performance of basic actions such as “Kata” may be different from a performance of actual Bunraku play.

Conclusions

Along with the previous finding, the results suggest that a common breathing technique is used among the Japanese traditional performing arts of Kyogen, Kabuki, and Bunraku.

Keywords

theater; Japanese traditional performing arts; Bunraku (Japanese puppet play); breathing; skill proficiency

BASIC TECHNIQUE AND TONE DEVELOPMENT FOR BEGINNING FLUTE STUDENTS: A TEACHING EXPERIENCE REPORT

Andre Sinico^{1}*

¹ Graduate Music Program, Federal University of Rio Grande do Sul, Brazil

* Correspondence: asinico@hotmail.com

Background

The teaching of a basic flute technique includes instructing students on how to develop good posture, breathing control, embouchure, and fingering. These aspects are closely interrelated as far as sound production is concerned. It follows that the flute teacher needs to be aware of the importance of these basic technical aspects from the very first lesson so that beginning students will receive meaningful instruction. In addition to good teaching materials, it is expected that the teacher will discuss not only learning strategies but also effective ways of planning individual practice time between lessons.

Aims

This text reports how basic technique was introduced to beginning flute students with a special focus on the production of sound during the 3rd Music Week at Petrolina, Brazil.

Method

I based this report on to my own experience as a teacher of beginning flute students enrolled at the 3rd Music Week at Petrolina, Brazil during the week of 17-22 November, 2014. The class was made up of 11 students, 10 male and one female. At this point in time, most of the students had never had individual lessons but worked as a group with the local bandleader. During this week, students were exposed to six-hour group lessons daily in order to work on basic flute technique and practicing strategies.

Results

Group activities focused on the development of a basic posture and understanding flute alignment and isometrics so that students could perceive impressive improvement on sound production and sound quality. In order to work on the development of a good embouchure, I presented “super chops,” an exercise aiming at developing face and lips muscle tonicity. Not all students were able to realize the task but the ones who did showed considerable gain in tone production. We worked on acquiring control of breathing through “finger breathing,” an exercise quite familiar to wind players that does not require any kind of equipment. The rate of success was highly substantial and the students could see immediate results. In addition, I introduced a series of exercises proposed by Moyse, Galway, and Bernold and Dick, as well as the use of major and minor triads to boost intonation and the practice of scales and arpeggios to even out the proficiency of fingerings across the three octaves of the instrument. We rehearsed and presented flute trios specially designed for beginners. To celebrate the success of this intense week I left them with a practice schedule comprising basic exercises combined with learning strategies.

Conclusions

During this brief albeit intense week, this group of students underwent a remarkable development in the quality of sound production. Each exercise geared towards breathing, intonation, and finger dexterity contributed to improve technique so long as each individual participant maintained correct posture. As soon as good posture was overlooked, each one of the other aspects came crumbling after. Students had an excellent chance of understanding how crucial good posture is and how it interacts with all aspects of flute playing. At the final presentation, each student reported on the technical aspects and elements of sound production worked during the week and exhibited remarkable confidence as they performed flute trios.

Keywords

flute; basic technique; tone development; beginning students; teaching experience report

MICRO-TIMING AS A FEATURE FOR INVESTIGATING MUSICALITY

Diana Siwiak^{1,2}, Ajay Kapur², and Dale A. Carnegie²*

¹ New Zealand School of Music, Victoria University of Wellington, New Zealand

² School of Engineering and Computer Science, Victoria University of Wellington, New Zealand

* Correspondence: diana.siwiaak@ecs.vuw.ac.nz

Background

New digital technologies and innovative tools provide the ability to research both the teaching and learning of music performance techniques. A survey of professional musicians indicated that musicality is a notable attribute for understanding the traits of professional musicianship. Musicality is a musician's ability to reveal an emotion or a personality characteristic by creating a musical experience. The ability to intrinsically express musicality is a desired talent for a young, promising professional musician. We discuss how timing events, with respect to musicality, can be a quantifiable aspect for studying music performance traits.

We implemented digital signal processing techniques to detect the low-level features, such as note onsets and rhythmic events, which are used to differentiate a professional musician's performance from a MIDI performance. Minor flexibility in tempo, or nuance, often directly relates to a musical phrase. This nuance includes, for instance, the tendency to slightly increase the tempo towards the peak of a musical phrase and to slightly decrease tempo towards the conclusion of a musical phrase. This internal tempo modulation, or *micro-timing*, is a feature that MIDI generally does not communicate. Studying *micro-timing* will help researchers understand the difference between MIDI and a professional musician. We can then convey this information to a music student to create a more intuitive understanding of one's musicality.

Aims

Our research posits that *micro-timing* relates to musicality and that studying *micro-timing* gives insight into how professional musicians perform.

Main contribution

MIDI iterates through the composition with exact rhythmic and metronomic accuracy, but this is not necessarily musically correct. Our research evaluated *micro-timing* events in order to study the rhythm aspect of musicality. Initial experiments identified that there are differences in the *micro-timing* between note onsets when comparing a professional to MIDI. A professional musician expresses phrasing through these temporal deviations.

We asked six professional flute players to perform selection Number 1 from Marcel Moyse's *24 Petite Etudes Mélodiques*. The work has 16 measures in total: one *large* musical phrase (from beginning to end), two *medium* musical phrases containing eight measures each, and eight *small* musical phrases of two measures each. The rhythmic form with respect to the small phrases is *AAAB*, *AAAB'*. Each subsequent restatement of the *A* rhythm generates anticipation towards the end of each medium musical phrase. One natural tendency to convey this expectation is to mold the rhythmic feel using *micro-timing* techniques.

Each of the six professional flutists varied the tempo within these musical phrases, speeding up towards the peak of the musical phrase and slowing down towards the conclusion of the musical phrase. Apparent during an aural evaluation, this *micro-timing* variation was consistent amongst the five professional flutists. Digital signal processing revealed bell-like curves from the *micro-timing* of the professional versus the MIDI. This is an example of how *micro-timing* relates to musicality.

Implications

We can infer from this research that studying a measurable concept such as *micro-timing* with respect to musicality gives us a better idea of what makes a performance musical. We aim to discover how such a quantified metric can be communicated to musicians seeking to refine their technique towards a measured professional level. Performance education would benefit from a framework that reproduces the unique musicality of professional musicians.

Keywords

musicality; micro-timing; feature extraction; music structure; performance analysis

THE COGNITIVE SKILLS USED WHEN LISTENING TO MUSICAL HARMONIES AMONG JAZZ MUSICIANS

Noriyuki Takahashi¹* and Yoko Oura²

¹ Faculty of Education and Welfare, Aichi Prefectural University, Japan

² Niigata University, Japan

* Correspondence: noriyuki@ews.aichi-pu.ac.jp

Background

Excellent cognitive skills acquired through musical training are useful for all types of musical performances. However, there is little empirical evidence of the music style-specific nature of these cognitive skills. In jazz, harmonies are habitually ornamented with tension notes to encourage improvisatorial freedom and, consequently, jazz musicians need to handle these complicated harmonies. Hence, jazz musicians seem to acquire some style-specific cognitive skills in order to manage these kinds of harmonies.

Aims

We compared the cognitive skills required for tension harmonies among jazz musicians and classical musicians. We hypothesized that jazz musicians can detect the basic harmonic character (i.e. major triad, minor triad, and dominant 7th) of each tension chord more accurately than classical musicians.

Method

We recruited jazz pianists (n=9) and classical pianists (n=9) as participants of this experiment. There was no significant difference between the two groups concerning the average years spent in musical training. The results of a relative pitch test also revealed no significant difference between these two groups.

For this experiment, we prepared 24 musical stimuli. The stimuli comprised paired short chord music (i.e. no melody) with the same harmonic progression. All progressions were composed of major triad, minor triad, and dominant 7th chords, and their basic tonal frames were in C Major (temporal modulations were specifically included with borrowed chords from other keys).

Half of the stimuli were labeled “tension” where tension notes were added to the former ones in the paired progression. The other half of the stimuli were labeled “basic” as no tension notes were added to the paired progression. Furthermore, the latter progression was modified in half of the instances for each stimulus group where the chord type was altered for one of the chords (e.g. a major triad was changed into a minor one).

Participants were asked to listen to the stimulus through headphones and evaluate the discrepancy between the two paired harmony progressions. They were instructed to indicate the item “same” if the two progressions were perceived to be identical. If the two progressions were perceived to be different, they were asked to indicate the measure on the staff where the chord type was different. All stimuli were presented in a random order.

Results

The rate of correct answers given to both the “tension” and “basic” were calculated for each group respectively. While significant differences were found between the two groups for the tension stimuli ($p < 0.01$), there were no significant differences found between the groups for the basic stimuli.

Conclusions

The results seem to support our hypothesis that jazz musicians can detect the basic harmonic character of a chord with tension notes more accurately than classical musicians. Therefore, we conclude that there exists a style-specificity for the acquisition of cognitive skills for music. We speculate that this cognitive skill might be useful to grasp the harmonic frame of a song effectively in a jazz performance and also while learning jazz music.

Keywords

style-specificity; cognitive skill; jazz musician; tension chord; basic harmony

Acknowledgments

We thank all the pianists who participated in the experiment.

CORRELATION ANALYSIS AMONG CHILDREN’S MUSIC IMPROVISATION, THE MEASURE OF CREATIVE THINKING IN MUSIC, AND THE BIG FIVE PERSONALITY TRAITS

Ichiro Umata^{1}, Chika Nagisa¹, Yuya Sakai^{1,2}, and Jun’ichi Ogawa¹*

¹ Research and Development Department, Yamaha Music Foundation, Japan

² Faculty of Education and Culture, University of Miyazaki, Japan

* Correspondence: umata@skyblue.ocn.ne.jp

Background

Many studies have analyzed creative activity not only in music but also in such fields as painting and photography, as well as the effects of personal traits on creative activity. However, few studies have conducted quantitative analyses of the correlation between music creation and personal traits.

Aims

We analyzed the correlation among the Big Five personality traits test scores, Webster's Measure of Creative Thinking in Music (MCTM) scores, and the Music Improvisation Task evaluation scores of 10-year-old children to examine whether personal traits are an independent factor in music creation research.

Method

We recruited 50 10-year-old students from the Yamaha Music School for our experiment. They took the Big Five personality traits test for children, the Measure of Creative Thinking in Music (MCTM), and the Music Improvisation Task. MCTM measures creative aptitude in music and identifies divergent and convergent thinking skills in music using musical tasks in game-like contents. In the Music Improvisation Task, children improvise a piece of music on a piano using a given motif, which is a sequence of notes: "D-E-D." MCTM's evaluation items consist of Musical Extensiveness (ME), Musical Flexibility (MF), Musical Originality (MO), Musical Syntax (MS), and a total score. The Music Improvisation Task's evaluation items consist of Melody, Rhythm, Harmony, Pitch Range, Articulation, Motif (the way they used the given motif), Form, Mood, Expression, Preference, Appeal, and a total score. Both the MCTM and Music Improvisation Task scores were evaluated by different groups of evaluators. We conducted Spearman's rank correlation analyses among the BIG FIVE personality traits test scores, the Measure of Creative Thinking in Music (MCTM) scores, and the Music Improvisation Task evaluation scores.

Results

The Big Five scores showed significant correlation with the Music Improvisation Task scores. The Conscientiousness (C) of the Big Five showed significant correlation ($r_s > 0.3$, $p < 0.05$) with all of the Music Improvisation Task items, and the Openness for Experience (O) of the Big Five showed significant correlation ($r_s > 0.3$, $p < 0.05$) with Motif, Form, and the Expressiveness of the Music Improvisation Task scores. The MCTM scores also showed significant correlation with the Music Improvisation Task scores, and MF, MO, MS, and the total score of MCTM showed significant correlation with the Range item of the Music Improvisation Task. However, we found no significant correlation between the Big Five and MCTM scores.

Conclusions

Although the Big Five personality traits and MCTM did not show any significant correlation, both showed significant correlation with the Music Improvisation Task evaluations. Our result suggests that creative thinking in music and personality traits are independent factors that might affect the music creation of children.

Keywords

music; creativity; improvisation; personality trait; MCTM

PERFORMANCE-RELATED MUSCULOSKELETAL DISORDERS: CHINESE OPERA PERFORMANCE TRAINING

Tai-Jui Wang^{1}, Chih-Long Lin², and Rungtai Lin³*

¹ Department of Mass Communication, Chinese Culture University, Taiwan

² Department of Crafts and Design, National Taiwan University of Arts, Taiwan

³ Graduate School of Creative Industry Design, National Taiwan University of Arts, Taiwan

* Correspondence: wtd@pccu.edu.tw

Background

Performance related musculoskeletal disorders (PRMDs) are a frequent reality for training Chinese opera performers. Many aspects of the acting training make performers particularly susceptible to PRMDs. This study explored the prevalence of PRMDs among Chinese opera performers and assessed the frequency, types, and locations of PRMDs. Also identified were treatments used for PRMDs, contributing factors to PRMD development, and the perceptions of the Chinese opera community regarding PRMDs.

Aims

The purpose of this study focused on the evaluation of musculoskeletal disorder problem for the professionals and students in traditional Chinese opera training and working places. For the training issues, the “Five Methods” are the basic performing skills in Chinese opera. They concern the manner of hands, eyes, head, feet and legs, and body that present the movements of the Chinese opera performer’s body capabilities. Therefore, the aim of this paper was directed towards three types of disciplines, which can be described as “Basic Exercises” (Ji-ben-gong), “Mat-work Acrobatics” (Tan-zi-gong), and “Hand-prop Martial Routines” (Ba-zi-gong). They are all important foundations in training for the traditional Chinese Opera curriculum.

Method

For the methods, we use a questionnaire that was a modified version of the Nordic musculoskeletal questionnaire (NMQ) and OSHA’s musculoskeletal disorders (MSDs). The questions about musculoskeletal aches and pains assessed the severity of PRMDs in nine body sites (neck, shoulders, upper back, elbows, wrists/hands, lower back/hips, thighs, knees, and ankles/feet) during the training for and performing of Chinese opera. 108 questionnaire were collected total (43 professionals and 65 students).

Results

The questions addressed were: (1) how frequently do Chinese opera performers experience PRMDs; (2) where in the body do Chinese opera performers experience PRMDs; (3) what treatments are Chinese opera performers using in the management of PRMDs; and (4) what relative factors of PRMDs in professionals and students might possibly cause absence or injury.

The result indicated the three most impact factors were wrists/hands (professionals=87.5%, students=53.8%), lower back/hips (professionals=54.1%, students=65.3%), and knees (professionals=70.8%, students=61.5%).

Conclusions

Chinese opera performers felt strongly that the medical profession did not know how to treat a Chinese opera-related injury. They believed that a knowledgeable teacher was the best resource against the onset of PRMDs even though technical aspects of acting were not identified as significant contributors to PRMDs. The Chinese opera performing arts population needs more information about PRMDs in order to develop treatment and prevention strategies in scientific methods. Hopefully, both professionals and students will reduce absence and injury and the PRMD problems revealed in this survey of traditional Chinese opera training and working places can be reduced in the near future.

Keywords

Chinese opera; ergonomics; performance related musculoskeletal disorders; subjective discomfort rating

BRAZILIAN ACOUSTIC GUITAR STUDENTS IN MASTERCLASSES: A PRELIMINARY PROFILE STUDY

*Ricieri Carlini Zorzal¹**

¹ Department of Arts, Federal University of Maranhão, Brazil

* Correspondence: riciviolao@terra.com.br

Background

Recent research in music performance learning demonstrated emphasis on self-responsibility and autonomy for students during their development process. Acoustic guitar students seek instrumental improvement in music festivals, especially in masterclasses. A particular question emerges: is it possible to find a specific profile for these guitar students?

Aims

The present work aspired to investigate preliminary information about the Brazilian acoustic guitar students’ profile in masterclasses.

Method

The researcher observed in loco four Brazilian musical festivals in different regions, totalling 42 masterclasses. A structured questionnaire was administered to students who performed these masterclasses. This questionnaire was constructed in three parts. First, personal characteristics of the subjects studied were explored. Second, the relation-

ship of the student with educational music was investigated. Third, questions about preferred repertoire on the instrument and motivation to participate in the festival were carried out. Lastly, semi-structured interviews with the musical instructors were fulfilled. The data obtained from the questionnaires were tabulated and the interviews were transcribed and categorized with the software package NVivo.

Results

34 students (32 male and 2 female) answered the questionnaire. Age varied from 16 to 34, with the majority between 20 and 22 years. Musical training indicated that most of respondents had a graduate degree in Music, but not a technical degree. Thus, post-graduate degrees were not in their formative aims.

Students' repertoire preferences for masterclasses focused on Baroque, Classical, and 20th Century repertoire. Preferred motivational aspects for festival participation were: improving musical knowledge, viewing recitals and masterclasses, and meeting other musicians.

Seven professors agreed to answer the questionnaire. They highlighted the diversity of musical training profiles in technical aspects.

Conclusions

The restricted number of interviewed guitar students doesn't allow confirmation of a specific profile for Brazilian music festivals. However, data collected from this research showed that masterclasses reflect characteristics of institutional music training, based on learning processes from European traditional notated music. Diverse technical levels of musical training, as indicated by the professors, may result from an irregular pattern of musical training from distinct Brazilian regions. This aspect also may be subject to future investigations.

Keywords

musical education; performance; profile; masterclass; acoustic guitar

Acknowledgments

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Thematic session Performance education II

CODE CLASHES IN DRAMA EDUCATION

*Chris Hay¹**

¹ National Institute of Dramatic Art, Australia

* Correspondence: chris.hay@nida.edu.au

Background

In a 2008 article examining the low uptake of music at GCSE level, Alexandra Lamont and Karl Maton introduced the idea of the code clash between students and teaching. They argued that, at this level, the students' dispositions to learning no longer matched the dominant mode of knowledge transfer encouraged or necessitated by the curriculum. The "rules of the game" had changed, and students who had previously met with success in the subject found themselves performing poorly academically.

Aims

In this paper, I will explore three separate instances of the code clash in drama education, as case studies of the wider field of creative arts education:

- (1) the difference between the dispositions students are asked to adopt in the drama classroom versus their other classes;
- (2) the code clash present within the New South Wales secondary school drama curriculum itself, particularly between Stages 5 and 6; and
- (3) the potential for code clash between secondary and tertiary drama education.

Main contribution

Drawing on Pierre Bourdieu's concepts of habitus and taste, I will explore how each of these clashes might be resolved or minimized by teachers. At a base level, habitus refers to the feel for the game possessed by agents in the field, and understanding its operations for both teachers and students offers a way of accounting for the distinctiveness of creative arts pedagogy.

Implications

As creative arts academies around the world are subject to further regulatory oversight, the ability to articulate methodologies of learning and teaching is of crucial importance. Despite this, much of the field is still under the sway of what Rachel Forgasz calls the myth of the mysteriousness of the creative process. The research I will outline in this paper offers a new framework for secondary and tertiary teachers to analyze learning and teaching in their classroom, giving them the tools to become self-reflexive practitioners.

Keywords

learning; teaching; drama; knowledge; sociology

BELIEFS, OBLIGATIONS, AND EVOLVING IDENTITY: THE ROLES OF PERFORMANCE IN TERTIARY MUSIC EDUCATION CURRICULA

Dale Misenhelter^{1*}

¹ Department of Music, University of Arkansas, USA

* Correspondence: dmisenh@uark.edu

Background

Music students in university music education programs must consider a variety of internal and external influences on their performance interests. They may also face identity quandaries, since many become socialized initially as performers, and only secondarily as teachers. They face a demanding socialization process into a profession with unusually multi-faceted pedagogical processes and performance expectations.

Aims

This two-part study examines the perceptions of tertiary students in music teacher preparation via reported internal and external rationales for performance, as well as perceived social importance of performance within and among academic and professional music role models.

Method

In the first part of the study, students in capstone internship coursework (N=19) at the conclusion of an undergraduate degree program responded to a series of statements designed to elicit a reflective response to questions regarding (1) internal beliefs concerning performance experience in their curricula, (2) externally imposed rationales for performance in the program, and (3) scaled responses to the perceived importance within the context(s) of social functions and performance across comprehensive uses of music in education. In the second part of the study, undergraduates (N=118) responded to statements with scaled responses regarding performance related musical roles (e.g. different types of "classical" performers, popular musicians, and music teachers) and activities (attending concerts, performing on recitals, winning auditions, attending conferences, teaching experiences, etc.) to identify relationships, if any, among these perceptions and participants' beliefs regarding role models. Participants were music education majors at two institutions (a comprehensive research university in the southern United States and a private conservatory in the north eastern United States), and were asked to respond to four multi-level items from a provided questionnaire.

Results

Initial analyses suggest that internal motives cited demonstrate a high regard for personal enjoyment yet minimal pedagogical connection to professional training, while external attributions are largely a function of requirements of degree programs. Lowest response data among social functions are in the area of conformity to social norms and the teaching of values in the educational process, with highest responses in regard to expressivity not normally revealed in typical classroom interactions.

Conclusions

Roles as performers assumed by students within the traditional university music school environment often demonstrate a distinction between skills preparation (performance majors) and teaching preparation (music education majors), despite a notable amount of shared curricula and performing experiences. An additional distinction typically is in evidence among their social and academic influences and activities common to these tertiary institutions. Curricular plans rarely demonstrate consideration of evolving student perceptions in degree requirements, although most would agree that shaping those perceptions is implicit in educational goals.

Keywords

performance; identity; social; internal; external

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DEVELOPING THE MUSICIANS: HOW TEACHERS CAN CONTRIBUTE TO PROFESSIONALISM

Yuki Morijiri*

¹ Institute of Education, University College London, UK

* Correspondence: yuki.m.h@gmail.com

Background

Generally, pianists report taking piano lessons from early childhood. This turns out to be a life-long process. A substantial body of research has addressed the relationships between students and their private music teachers to investigate the important features of private music lessons. The research findings indicate that teachers exert significant influence on students' perceptions, at least in a Western classical tradition, towards what counts as a good performance.

Aims

This research aims to investigate and identify the key features in tuition, which play important and influential roles in musicians' development. Also, the outcomes from data in this research would be utilized in considering teachers' roles in professional education for cultivating future pianists.

Method

The participants in this research were 68 piano performers, (age range=18-56, mean age=29.1, SD=7.9) who were based in Japan and the UK (male=28, female=40). At the time, participants were either currently majoring in piano at university, were graduates of piano, or were professional pianists. The research approach used a semi-structured interview asking participants to report what they remembered learning in lessons and also to report who they perceived as being their most influential piano teacher in terms of their own piano learning. The data analysis was undertaken using NVivo 10 and SPSS 22.

Results and discussion

In total, accounts of 350 teachers were reported from the participants. The mean age at which the participants met their most influential teacher was 18.54 years (SD=5.36).

The participants' memories of the content of lessons and any significant features which they had learned from each teacher were presented in quotation format which were then coded and classified by content. The categories from participants' recollections emerged as: *as a musician, interpretation, technique, how-to, tone quality, psychological aspects, fun, general musical expression, and repertoire*.

The reported teachers who contributed having "fun" to the learners were more distributed at a primary stage of piano learning. Thereafter, "technical" tuition dramatically rose and seemed to be dominant, particularly from later childhood to adolescence. In adolescence and early adulthood, "interpretation of music" was emphasized in tuition and hit a peak at the age of twenty-one (students' age) as well as "tone quality," in contrast to decreasing technical instruction. The tuition of "how to" manage performance or the integration of different skills were also assigned more frequently to ages in later adolescence and early adulthood.

Technical aspects were most frequently recalled for the majority of teachers; however, they were less likely to be assigned as the most influential teachers. The teachers who influenced their students by the reasons of "as a musician," "interpretation," and "how-to" were highly likely to be the most influential for piano learners because of learners'

professional and personal development. In addition to what the pianists learnt from their teachers, other remarkable points included how to emotionally connect to their teachers and how they respect their teachers.

Keywords

higher education; one-to-one teaching; piano performance; private teacher; influences

Acknowledgments

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Thematic session Performers at work

EXPERIENCES OF INDEPENDENT DANCERS: MOTIVATION AND MENTAL SKILLS

Imogen Auja^{1} and Rachel Farrer¹*

¹ Department of Performing Arts and English, University of Bedfordshire, UK

* Correspondence: imogen.auja@beds.ac.uk

Background

Previous talent development research in sport and music indicates that mental skills play an important role in maintaining motivation and negotiating talent development stages. However, little is known about these factors in dance, particularly with regard to the independent (freelance) dancer whose career may involve periods of instability and unemployment.

Aims

The aim of this study was to investigate the experiences of independent dancers from a psychological perspective, exploring dancers' motivation to work in a freelance capacity, and the extent to which dancers develop and employ mental skills in order to negotiate a career in this demanding sector.

Method

In-depth semi-structured interviews were conducted with 14 dancers at different stages of their careers. The dancers identified themselves primarily as performers and choreographers, although all were additionally engaged in teaching work. The interview guide included questions about the participants' pathways into the profession, advantages and disadvantages of working independently, and their motivation to work in a freelance capacity. Interviews were transcribed verbatim and content analyzed.

Results

Analysis revealed that the dancers were intrinsically motivated and highly committed to the profession. The dancers felt that the enjoyment and satisfaction derived from their work was sufficient to overcome the challenges of working in the sector. For example, one dancer explained: "Financially in general it's very hard to really earn enough money to survive just on this but at the same time it gives you a lot of freedom to really express what you want to tell the world, 'cause it's your vision." As the quote illustrates, the dancers' desire to work independently was borne out of a need for autonomy in the pursuit of artistic goals. However, while the dancers derived much of their identity from their work, some acknowledged that other life commitments required an adjustment in priorities: "...of course once you have a family, you have to take care in a different way again, so it's not just you saying, 'OK, I want to see the world'. You have to, you know, combine everything. That's a bit tricky." Most of the dancers reported that self-confidence was an essential attribute in continuing to persevere with their goals, while recognising that a flexible approach was necessary in order to cope with unpredictable working conditions. Networks and social support were perceived as instrumental; one dancer stated: "Once you have all the connections, you have all the networks, it's much easier." Importantly, the majority of the participants had not received any mental skills training; instead, these skills had developed intuitively over time.

Conclusions

Overall, the independent dancers were driven by intrinsic goals which were sufficient to overcome the challenges of the profession. However, the mental skills reported by the participants had developed intuitively and gradually in response to the demands that they faced; therefore, mental skills training could be invaluable for student and graduating dancers in order to enhance and maintain intrinsic motivation, self-confidence, and social skills. Furthermore, practical instruction on financial and marketing strategies would help dancers to prepare for a career in this fulfilling but challenging sector.

Keywords

dancers; freelance; motivation; mental skills; training

Acknowledgments

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WORK-LIFE IMBALANCE: THE IMPACT ON HEALTH AND WELLBEING OF PERFORMERS

*Jennifer R. Lisle**

¹ Faculty of Public Health, Royal Colleges of Physicians, UK

* Correspondence: jrhawk@globalnet.co.uk

Background

Lifestyle risk factors affecting health are very numerous and are responsible for a huge burden of disability and loss of wellbeing. These lifestyle risks, which affect the population as a whole, also affect the lives of performers, their ability to perform, the quality of their performance, and their health and wellbeing.

Modern life and a 24-hour society means that many people are getting 1-2 hours less sleep per night than in the past. Performers frequently have to cope with atypical, long working hours which can affect their health and the quality of performance. Stress, fatigue, and exhaustion have a deleterious effect on health and if not recognized or identified early can lead to health breakdown in the long term. Women combining work with family commitments are particularly at risk.

Aims

The aim of this paper is to demonstrate the importance for students and teachers of understanding the impact of long working hours, sleep loss, and work-life imbalance on the health and wellbeing of performers and on the quality of their performance.

Main contribution

Risks to health and wellbeing of long working hours, sleep loss, and work-life imbalance will be reviewed. How these factors impact performance and health will be discussed with reference to recent research and evidence that ignoring the internal biological or "body clock" will have damaging consequences for health and wellbeing. Women combining their professional work as performers with family commitments are at increased risk of fatigue and exhaustion. Cases will be presented which demonstrate the importance of both understanding and recognizing the seriousness of ignoring these issues. For teachers and students, especially at an early stage in their careers, it is essential to have an understanding of specific lifestyle risk factors which can affect performance, wellbeing, and health.

Implications

This research aims to provide a comprehensive understanding of the multiple factors that affect performance, which can be gained from an interdisciplinary approach. It is a complex area of research but one of growing importance as more is understood about lifestyle risk factors affecting health and wellbeing and the impact that these may have on performers and their performance.

Keywords

work-life imbalance; lifestyle risk factors; health; wellbeing; performance

HOW SHOULD CURRENT PERFORMER TRAINING METHODS AND CONTENT ADAPT IN RESPONSE TO THE EVOLVING PROFESSIONAL WORK ENVIRONMENT? AN EMPIRICAL STUDY REVIEWING THE SOCIAL, CULTURAL, AND ECONOMIC INFLUENCES AFFECTING THE FUTURE EMPLOYMENT PROSPECTS FOR NEW ENTRANTS TO THE MUSIC PROFESSION, AND HOW THIS MIGHT BE REFLECTED IN THE DEVELOPMENT OF MORE EFFECTIVE, CONTEXT-RELATED PROGRAMS OF STUDY

*Michael Spencer¹**

¹ Research Centre for Music and Culture, Ueno Gakuen University, Tokyo, Japan

* Correspondence: michael.spencer@sound-strategies.co.uk

Background

As a consequence of the decreasing number of pathways to full-time performance careers and the over-supply of new graduates for existing positions, increasing numbers of potential candidates fail to assume the full-time occupation for which they were trained. Other influencing factors include the impact of technology, global economic readjustments, increasing competition for the attention of potential audiences, cultural relevance, political expediency, and changing industry practice.

Incongruously, the opportunity for the public to engage with music has never been greater; however, this tends to be more as recipients than participants. Widespread music industry-led trends, providing content that is primarily commercially oriented, encourage passive mass consumption from multiple outlets served by technology. The physical manifestation of the musical product is increasingly distant from the actual process of creation and requires fewer human resources in its production. By way of contrast, opportunities for musicians to become active in a wide range of non-conventional settings involving practical interaction with music or musical process are growing in number and importance.

Socio-anthropological studies show that practical involvement in music making helps to catalyze and sustain social bonds. The process of music making also provides an important exemplar of social constructivist learning which has transferable potential. The increasing interest of non-specialists in engaging with music in different contexts, therefore, provides opportunities for developing a diverse range of styles of exchange that lie outside of the more usual performing environment, and employment possibilities for musicians.

Aims

The aims of this study are twofold. First, to identify and suggest new methods of conservatoire training which broaden the focus on the acquisition of high quality performance skills to include a requirement for the development of a more flexible range of expertise responsive to the increasing number of unconventional career opportunities and environments. Second, to encourage more effective, context-relevant advocacy practices in the training of performers in order to sustain and develop the public perception of the value of live interaction with music.

Method

This paper draws on several years of observation and participation in current and past performance training methods, work experience programs, and professional performance at world-class level in both freelance and full time capacities. Additionally, it includes anecdotal evidence and references taken from large-scale community programs and training interventions for the business sector.

Results

The wide ranging accumulation of qualitative analysis applied to the research for this paper has informed the development of performer/facilitator training programs in community arts practice in the UK, Japan, and Spain, and industry relevant training initiatives for global businesses.

Conclusions

With the growing interest in cross-disciplinary engagement, in particular the use of the liberal arts as a valuable adjunct to non-art related studies, opportunities are emerging for collaborative exchange in diverse and apparently unrelated areas. Consequently, performers should reevaluate their role in this increasingly changing and challenging context while addressing the need for greater flexibility in methods of engagement.

Keywords

music; training; methodology; community; business

Thematic session

Performance communication

EVALUATING PRESENCE BASED ON BALANCE

Tsutomu Fujinami^{1}, Shohei Hidaka², and Neeraj Kashyap²*

¹ Research Centre of Live Style Design, Japan Advanced Institute of Science and Technology, Japan

² School of Knowledge Science, Japan Advanced Institute of Science and Technology, Japan

* Correspondence: fuji@jaist.ac.jp

Background

Actors and dancers need to make their presence felt to others. Good actors leave us the impression that they are real just by standing. However, it is difficult to explain this effect of presence found among good actors.

Aims

What makes an actor real? How can we feel their presence? We approach actors' skill by collecting and analyzing data to establish a measure of presence.

Method

Two people were invited to take part in our experiment. We asked them to sit on a chair side-by-side, face-to-face, and back-to-back. Their Centre of Pressure (CoP) data were measured using a Wii-Fit Balance Board and were recorded onto PC using a program developed by one of the authors. The relevance of their CoPs was evaluated by calculating Hausdorff dimensions of the time series.

Results

We found that time series of CoPs for each participant were related to each other in all cases. The analysis revealed that the pair was best connected when they sat face-to-face as we had expected. However, the second best connection was found when they sat back-to-back, against our expectation that sitting side by side would result in a stronger connection than when they sat back-to-back.

Conclusions

The result indicates that our feeling of presence is not solely determined by sight. Repeating the experiment under different conditions may identify other factors. There are limitations to the current study due to the small samples. Further study will inform us of felt presence.

Keywords

presence; center of pressure; balance; Hausdorff dimension; posture

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DEVELOPING FAMILIARITY: A NEW DUO'S INDIVIDUAL AND SHARED PRACTICE FEATURES AND PERFORMANCE CUES

Jane Ginsborg¹ and Dawn Bennett²

¹ Centre for Music Performance Research, Royal Northern College of Music, UK

² Research and Graduate Studies, Curtin University, Western Australia

* Correspondence: jane.ginsborg@rncm.ac.uk

Background

Studies of expert musicians' preparation for performance have tended to make use of longitudinal data from individual performers, including classically-trained and jazz pianists, a cellist, and singers. The first author of the study to be

reported has undertaken extensive research on her own practice but also that of student singers. Fewer studies have been undertaken of musicians' preparation for ensemble performance other than that of Ginsborg, Chaffin, and Nicholson on the development of shared performance cues—landmarks for retrieval when performing from memory deriving from the features of the music to which the musician attends during practice and rehearsal—in a well-established duo. The question of how performers' mental representations of music shift as they become more familiar with it both as individuals and duo partners, working together for the first time, remains to be addressed.

Aims

The study aimed to explore the relationship between the features of the music to which the musicians attended and those they reported as individual and shared performance cues following two performances from memory.

Method

The participant-researchers in the study were both experienced musicians: a soprano and viola player who had not worked together previously. The music was also new to them both: settings to music by Boris Tchaikovsky dating from 1925-1926 of two poems by Rudyard Kipling translated (loosely) into Russian. The musicians undertook daily individual practice sessions and joint rehearsals for six days, annotating their scores after each activity to indicate the features of the music to which they had attended; they then gave an informal performance of the two songs to a small audience, the first (*Amazon*) given by the viola player from memory while the soprano used the score, the second (*Homer*) given by the soprano from memory while the viola player used the score. Finally they indicated their thoughts after each performance, representing individual performance cues and those that were shared.

Results

Structural features (sections, subsections, and switches) were noted initially but did not function for either musician as performance cues. Basic features included different kinds of preparation that were crucial for the singer's but not the viola player's performances from memory, the locations of breaths, word pronunciation, pitch (equally important for the viola player in her non-memorized and memorized performances), as well as fingering, bowing, and clef. Interpretive features included word meaning, sound, tempo, dynamics, and mnemonics. Aside from individual and shared expressive features and cues, the largest proportion of annotations referred to shared co-ordination. At around a third of the total number of locations of annotations, the viola player co-ordinated her phrase boundaries with the singer at breaths and elsewhere. At the remaining two-thirds of locations, the two participants had agreed mutually to co-ordinate other aspects of their music-making in the interests of expressivity such as colour and rubato. In all cases performances from memory drew on a larger number of features retained as performance cues than did the non-memorized performances.

Conclusions

The results will be discussed in terms of earlier findings and performance cue theory more generally.

Keywords

memory; rehearsal; songs; viola; voice

CONSENTING ADULTS: COMPOSER-PERFORMER COLLABORATION IN THE COMPOSITION PROCESS

Diana Blom^{1*}, *Kevin Hanrahan*², and *Jamie Reimer*²

¹Music, University of Western Sydney, Australia

² Glenn Korff School of Music, University of Nebraska–Lincoln, USA

* Correspondence: d.blom@uws.edu.au

Background

Some composers self-represent themselves as independent and autonomous, with no allegiances to stylistic schools or aesthetic commonalities with the work of other composers. Yet an artist is never truly alone. Often composers and performers work closely together as a work is composed and performer input can be at a macro-level—soprano Denise Duval asking Poulenc to delete an opera scene, which he did—or at a micro-level—violinist Joseph Joachim advising Brahms on technical issues in a concerto. For the contemporary performer and composer, this collaborative process is often a natural way of working. Pianist Zubin Kanga collaborated with several contemporary classical composers, his creative input ranging from being given freedom in his interpretative approaches to substantial theatrical compositional ideas.

Aims

This study investigates the creative collaboration between a composer and two singers during the composition of two song cycles: *Portrait of America*, for tenor and piano, and *Southern Songs* for soprano and piano. It focuses on the different levels at which creative input occurs and how this collaborative process can be passed on to students.

Method

The three performers and the researchers used email, Skype, and Dropbox to collaborate and share information. Journaling drew together this information-sharing and a body of data, drawn from the practice-led process, was gathered. Data were categorized in relation to micro-, meso-, and macro-level collaborative events; and the process was analyzed, tracing and tracking progress in order to describe it to others.

Results

Choice of texts was made by the singer, for one song-cycle, and by the composer with singer approval, for the other. The composer was familiar with the singers' voices, but both sent a voice profile, describing range (total and comfortable), timbral, and dynamic qualities, plus aspects of their voice and vocal devices they particularly liked. Because the songs were not long, few macro-level structural issues arose, although song order and poem interpretation were discussed. At the meso-level, dynamic shaping in relation to phrases, sections, and notes were decided or fine-tuned. Notes and phrases in an awkward part of the vocal range were altered and at the micro-level, discussion of text vowels and register for optimum sound were adopted by the composer. Harmonies in the piano part were rewritten to aid pitching the vocal melody and piano pitches were changed to make a line more "singable."

Conclusions

Collaboration took place at all three levels of the composition process. At the macro-level issues were on structure, interpretation of the poem and song order. Valuable composer information was gained from the meso- and micro-level comments, all of which were drawn into the scores. The performers gained a sense of ownership of the songs through their musical and technical input and welcomed the inclusion of their creative thinking. By tracking their process, the three performers, all teaching academics, attempted to find a way to introduce students to this composer/performer collaborative approach and, in doing so, to suggest a way of working with song repertoire, different from the usual.

Keywords

collaboration; performer; composer; process; input-levels

Thematic session Performance education III

CROSS-CULTURAL PERSPECTIVES ON THE CREATIVE DEVELOPMENT OF CHOIRS AND CHORAL CONDUCTORS

John Rink¹ and Mirjam James¹**

¹ Faculty of Music, University of Cambridge, UK

* Correspondence: jsr50@cam.ac.uk; mirjam.james@googlegmail.com

Background

To date, the theory and practice of choral music have not received the scholarly attention they merit, despite significant contributions by e.g. Keller and Ternström. To complement the existing literature, a one-year research project conducted by the Universities of Cambridge and São Paulo focused on the creative development of choirs and choral conductors in different musical and educational contexts. Initiatives being pursued independently at both institutions to enhance the theory and practice of choral singing were investigated side by side; these initiatives include the recently established MMus in Choral Studies at Cambridge, which develops conducting skills through video-based workshops, seminars, and observations, and USP's Coro de Câmara Comunicantus, which focuses on enhancing the experience of individual singers as part of the whole ensemble.

Aims

The project addressed the following research questions:

- (1) To what extent do choral practices and cultures in distinct national, institutional, and artistic contexts differ or resemble one another, and what might we learn from their similarities or differences?
- (2) With reference to these distinct choral practices and cultures, what new approaches to choral development might be defined through comparative analysis and collaborative experimentation?
- (3) Within these distinct choral practices and cultures, how does the creative development of individuals in vocal ensembles take place, and how does it relate to the creative development of the ensemble as a whole?

Method

The project was divided into two stages devoted to data capture (Stage 1) and to analysis, testing, and promulgation (Stage 2). Each stage featured a residency of the UK team at USP and a reciprocal residency in Cambridge. Investigation was pursued through workshops and seminars; observation of and participation in rehearsals and performances; and focus-group discussions with individual singers and choral conductors from diverse ensembles.

The main objectives were as follows:

- (1) Comparative analyses of choral practices in respective cultural contexts.
- (2) New understanding of the creative development of individuals in vocal ensembles and how “group creativity” functions in such contexts.
- (3) Assessment of the extent to which common musical values, techniques, and approaches underlie the work of distinct choral cultures.

Results

This paper focuses on the second objective, in particular the focus-group discussions. Results derived from content analysis using an inductive coding system to define and explore categories will be presented.

For example, although all participants indicated the importance of getting on with others in a choir, two different approaches were observed: one of them prioritized singing, with social links developing thereafter; the other prioritized social relationships, with singing as the second priority.

Conclusions

Conclusions related to the influence of past and present choral experiences, approaches to individual practice and rehearsal, social aspects of participation in choirs, and differences between performance strategies in sacred and secular contexts will be outlined in the paper, with practical benefits discussed and assessed.

Keywords

group creativity; choral singing; choral conducting; cross-cultural research; performance strategies

Acknowledgments

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PROMOTING SELF-AUTHORSHIP: A COMPLEMENTARY APPROACH TO TEACHING MUSIC PERFORMANCE IN HIGHER EDUCATION

Gilvano Dalagna^{1*}

¹ Department of Communication and Art – INET/MD, University of Aveiro, Portugal

* Correspondence: gilvano.d@gmail.com

Background

Several authors have argued that the basis for advanced learning outcomes in higher education should be the promotion of self-authorship, i.e. the capacity to internally define and coordinate a coherent belief system and identity with the larger world. This involves the capacity to actively listen to multiple perspectives, critically interpreting them making judgments accordingly. However, self-authorship has been poorly explored in teaching music performance, especially in higher education. The lack of such constructive approaches has been identified and recognized as one of the main reasons for a difficult transition from student to professional.

Aims

This research discusses the creation of a course module that can act as a complementary approach to teaching music performance, grounded on constructive principles that may promote self-authorship.

Main contribution

The current teaching-learning practices in some higher education institutions still seem to be far away from the ideal scenario of teachers as artistic mentors, who give psychological, professional, and artistic support, nurturing critical thinking, decision-making, and self-reflection. The training of musicians mainly focused on instrumental/vocal technique seems to create a dichotomy between the skills being prioritized and those needed to live a full, rewarding life in music. In order to change this current tendency, research advocates the need for flexible curricular programs that allow the development of student's artistic ideals. An example of such types of programs is the course program presented here: an artistic mentoring program in music performance (AMPMP) that facilitates the student's processes of bridging an artistic ideal with career opportunities within the professional world. The AMPMP is a pack of nine weeks of individual and collective sessions, organized as an extracurricular module. The sessions are conceptualized according to the students' perceptions of how their artistic ideals can be professionally promoted. The ultimate goal is to facilitate the development of the capacity to internally define a coherent belief system and identity that coordinates engagement in mutual retains with the larger world, i.e. self-authorship.

Implications

Despite the growing interest in understanding students' artistic ideals, there are few studies focused on how to create and implement educational programs that could facilitate the achievement of such ideals. In fact, the need for such programs has been pinpointed in music pedagogy as early as the 19th century. The conceptualization and implementation of a course such as AMPMP constitutes an attempt to respond to such urge in music performance education.

Keywords

self-authorship; mentoring; higher education; artistic ideals; music performance

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Thematic session

Performance health and wellbeing

**USE OF PERFORMANCE TOOLS TO IMPROVE OUTCOME OF MEDICAL TREATMENT:
MANIPULATING THE PLACEBO RESPONSE IN EXPERIMENTAL PAIN**

Anat Biegon^{1*}, Atay Citron², Uri Alon³, and Efrat Czerniak⁴

¹ Neurology, Stony Brook University, USA

² Theatre, University of Haifa, Israel

³ Molecular Cell Biology, Weizmann Institute of Science, Israel

⁴ J. Sagol Neuroscience Center, Tel Aviv University, Israel

* Correspondence: anat.biegon@stonybrook.edu

Background

The "placebo response" is defined as improvement of clinical outcome in individuals receiving inactive drugs, thought to be mediated by the learning and reward circuitry of the brain and subject to manipulation by suggestion and treatment style. In the present study, a professional actor playing a physician enacted two rehearsed scenarios and sets of directions aimed at creating distinct performance styles and establishing their effect on placebo analgesia in healthy volunteers.

Aims

The study was designed to test the impact of physicians' performance style on the pain threshold and tolerance in healthy subjects exposed to experimental pain and administered placebo medication.

Method

One hundred and twenty healthy volunteers (men and women, 18-45 years old) performed the cold pressor test (involving immersion of the dominant hand in ice cold water) and were assessed for pain threshold and pain tolerance at baseline. Subjects then filled a detailed personality questionnaire (MMPI-2), followed by a ~five-minute encounter with the actor. In scenario 1, the actor's verbal and non-verbal performance conveyed detachment and preoccupation. In this scenario, the actor spent at least two minutes typing on the computer without making eye contact with the subject. In scenario 2, the actor engaged the subjects in conversation with frequent eye contact. He also told the subjects that the ointment was a newly-developed pain relieving medication specifically chosen for maximum benefit for each one of them, based on their personality. At the end of both scenarios, the subjects were instructed to apply the ointment (hand moisturizer) to their dominant hand, and the pain test was repeated 10 minutes afterwards. Subjects demonstrating an increase of 30% or more in pain threshold relative to baseline were defined as placebo responders. Results were analyzed by 2-way ANOVA followed by Fisher's LSD post hoc comparison, with $p < 0.05$ considered significant.

Results

The performance style was found to have a statistically significant effect on pain threshold, which was higher in subjects exposed to scenario 2 relative to scenario 1 ($p < 0.03$). Further analysis revealed that this increase arose entirely from the subgroup of subjects who were defined as placebo responders. In placebo responders exposed to scenario 1, the mean placebo effect size was 80% (increase over baseline), which rose to 131% in subjects exposed to scenario 2 ($p < 0.05$). The change in pain threshold relative to baseline was exactly the same in placebo non-responders exposed to scenario 1 and scenario 2.

Conclusions

These results support the hypothesis that manipulation of physicians' performance style to increase faith in the medication offered may have a significant beneficial effect on the size of the response to placebo analgesia in a subgroup of the population. They also demonstrate that subjects not susceptible to placebo are also not susceptible to performance style. Further studies on patient populations suffering from pain or other health problems are needed to determine whether this approach can be used to improve medical treatment in clinical settings.

Keywords

placebo; performance; analgesia; pain; reward

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SYMPTOMS OF CRANIOMANDIBULAR DYSFUNCTION IN PROFESSIONAL ORCHESTRA MUSICIANS

Anke Steinmetz¹*, Alexander Zeh¹, Karl-Stefan Delank¹, and Ingrid Peroz²

¹ Department of Orthopaedics, Traumatology and Physical Medicine, Martin-Luther-University of Halle, Germany

² Department of Prosthetic Dentistry and Oral Gerontology, Humboldt University of Berlin, Germany

* Correspondence: anke.steinmetz@uk-halle.de

Background

Up to 80% of professional musicians are affected by playing-related musculoskeletal disorders, but data regarding the frequency of craniomandibular dysfunction (CMD) in professional orchestra musicians are scarce.

Aims

The aim of this study was to evaluate the frequency of CMD and its relation to musculoskeletal pain in various body regions.

Method

A questionnaire-based survey approach assessing CMD symptoms and musculoskeletal pain in professional orchestra players was adopted. Relative prevalence rates and prevalence ratios for different instrument groups were estimated.

Results

A total of 408 musicians completed the questionnaire (response rate=57%). Playing-related pain in the teeth or jaw was reported by 19-47% of musicians and TMJ pain by 15-34%, depending on the instrument group. Current pain in the face indicating a painful CMD was reported in 6-10% and related symptoms, such as teeth grinding in 25-34%, jaw clenching in 33-42%, and jaw locking in 11-18%, were reported. Females were 2.4 times (95% confidence intervals [CI] 1.49-3.84) more likely to report having had orofacial pain within the last month. Musicians reporting orofacial pain within the last month were 4.8 times (95% CI: 2.83-8.02) more likely to report pain in the neck and 2.5-3.8 times ($p < 0.05$) more likely to report pain in other body regions, including shoulders, right wrist, left fingers, and the thoracic and lumbar spine.

Conclusions

Symptoms suggesting CMD were common in this study of professional orchestra musicians and were associated with pain in the neck, shoulder, and hands. There is a need to enhance awareness of CMD to optimize early medical diagnosis and treatment.

Keywords

craniomandibular disorders; musculoskeletal pain; musicians; playing-related musculoskeletal disorders; temporomandibular joint disorders

FOCAL DYSTONIA IN PIANISTS: IS THERE A CRUCIAL EARLY CLUE?

Hara Trouli¹*

¹ British Association of Performing Arts Medicine, UK

* Correspondence: haratrouli@gmail.com

Background

The devastating condition of musician's focal dystonia is believed to derive from unaddressed technical inadequacies that, over time, confuse the nervous system signals. It is possible that some dystonic elements are present in early stages that go undetected by teachers, students, and professional musicians themselves and are eventually incorporated in practice routines. If a method can detect these early dystonic elements and modification is applied timely, there could be potential prevention of established focal dystonia.

Aims

We aimed to suggest and discuss the possibility that "pre-dystonic" elements can be recognized and evaluated early in order to introduce reversal and possibly therapeutic mechanisms and avoid the subsequent development of focal dystonia with its well-known difficulties in treatment.

Method

We labelled as "pre-dystonic" the involuntary movements that, although present, do not interfere with the mechanics of performance. We assessed the performance of five pianists, two with established focal dystonia in one hand and three with no knowledge of these motions. We assessed the pianists with a multimodal method of MIDI, surface electromyography, and video filming.

Results

We will present the measurements as taken by the multimodal method and outline these in comprehensive and reproducible charts for all five pianists with controlled "pre-dystonic" elements in the motion of both hands. We will correlate these to other technical elements as seen by our multimodal method, such as the activity of the muscular groups and the postural presentation of the upper limbs.

Conclusions

These findings will possibly indicate that this stage of "unawareness" may be crucial in determining the progress of focal dystonia. It seems equally crucial to convey this to teachers, their students, and to professional pianists. The

educators can therefore contribute early in prevention but also act in partnership with the medical specialists. The multimodal system can be used not only for the detection of the abnormal motion but also for assisting its elimination through biofeedback.

Keywords

focal dystonia; prevention; educators' role; multimodal assessment; biofeedback

Thematic session Synchrony and timing

READY, SET, GO: MAPPING THE GESTURES USED TO CUE ENTRANCES IN DUO PERFORMANCE

Laura Bishop^{1} and Werner Goebel²*

¹ Austrian Research Institute for Artificial Intelligence, Austria

² Institute for Music Acoustics, University for Music and Performing Arts Vienna, Austria

* Correspondence: laura.bishop@ofai.at

Background

Ensemble musicians exchange visual cues to coordinate the starts of pieces. These “cueing-in gestures” enable the synchronization of starting notes and facilitate the coordination of tempo. The gestures that musicians make during performance have been found to preface sounded changes in expression; however, the motion characteristics of cueing-in gestures and their relation to piece structure have received little attention in the literature. People associate acoustic and motion parameters in predictable ways, so it is likely that some characteristics of cueing-in gestures depend on structural parameters of the music and are used similarly by performers of different instruments.

Aims

This study investigated the cueing gestures used to coordinate the starts of pieces during duo performance. The relationships between gesture duration and starting tempo and between gesture magnitude and starting dynamics were assessed. Pianists' and violinists' gestures were compared to test whether some movement characteristics are similar across musicians, regardless of instrument.

Method

Piano-piano, violin-violin, and piano-violin duos learned short passages drawn from the beginnings of Western classical music pieces. Following a duo rehearsal period, participants performed each of the passages twice. During each performance, one performer or the other was given a particular tempo via headphones and instructed to act as the leader, starting the joint performance off without speaking. Participants were asked to focus on synchronizing as precisely as possible. Performers' head movements were tracked using Kinect sensors (positioned directly above them), and accelerometers, which were strapped to their foreheads and measured acceleration in three dimensions. A second accelerometer tracked violinists' bowing hand movements. Audio and MIDI data (from the Clavinovas played by pianists) were recorded as well.

Results

Preliminary data analyses suggested that most performers who were assigned the “leader” role adopted one of three cueing strategies: (1) they used a single head nod to indicate both onset of the first note and piece tempo; (2) they used a series of head nods to indicate onset of the first note and communicate tempo more explicitly; or (3) they used bowing hand movements to indicate onset of the first note and piece tempo (violinists only). Cueing movement velocity and the period of cueing movement sequences are expected to relate to piece tempo, while movement magnitude is expected to relate to piece dynamics. More precisely executed cueing gestures should correspond to more successfully synchronized performances. Correlations in head movement patterns between leader and follower are also expected during well-synchronized performances, especially just prior to and during the first beat of the piece.

Conclusions

The results should show that ensemble musicians anticipate the starting tempo and dynamics of pieces with their cueing-in gestures. Head acceleration, primarily following an up-down nodding trajectory, is expected to be the primary cue for synchronizing starting note onsets, regardless of the piece structure or leader's instrument. Overall, the findings from this study will not only provide a mapping of the gestures used by ensemble musicians to cue entrances, but will also illustrate how performers adapt their gestures to the structural parameters of specific pieces.

Keywords

ensemble performance; interpersonal communication; motion capture; performance expression; synchronization

Acknowledgments

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DEVELOPMENT OF TIMING THROUGH INSTRUMENTAL PRACTICE

Dirk Moelants^{1}, Luc Nijss¹, and Marc Leman¹*

¹ IPEM-Department of Musicology, Ghent University, Belgium

* Correspondence: dirk@moelants.net

Background

Timing is one of the most studied topics in music perception research. Tapping tasks are commonly used to study perception and motor skills, and timing in music performance is considered a prime factor in expressivity. Despite this, the evolution of timing skills from beginning musicians to professional players has rarely been studied. One aspect of particular interest is the effect of the musical instrument. In this study the evolution of timing by violin and clarinet students were compared, two instruments that use completely different techniques and as such require different skills from the performers.

Aims

We wanted to see how timing evolves with the general skill level of the musicians, from beginners to professionals. When do they acquire a good sense of timing and in which way they deviate from “ideal” time ratios? Does the technical difference between the two instruments lead to a different sense of timing? And do these differences persist with increasing skill level or do they gradually disappear?

Method

Four simple rhythms were presented using a synchronization-continuation paradigm: a simple regular pulse at 120 BPM, a dotted pattern (3:1), a long-short-short pattern (2:1:1), and an irregular 8/8-pattern (3:3:2). 110 musicians participated, half of them violists and half clarinetists, divided in five skill levels from beginners to professionals. They were asked to play in synchrony with a metronome tick for 30 seconds and then continue playing the same rhythm for another 30 seconds. Their performances were recorded and the timing was analyzed in terms of synchronization, tempo, and microtiming.

Results

A clear evolution of timing was visible for both instrument groups. The timing became more regular and synchronization more precise. Already with beginning players we saw differences between the two instruments, clearly related to technical difficulties. Thus, clarinetists tended to slow down in order to regulate their breathing, while violinists tended to play the dotted patterns less “sharp” than clarinetists due to the difficulty of the bowing. Interestingly, some of these elements of microtiming persisted and were found even with advanced performers, only largely disappearing at the highest professional level.

Conclusions

This study gave a view on how timing evolved during the formation of musicians. It also showed that the choice of the instrument had an effect on the timing, related to technical difficulties.

Keywords

timing; music performance; learning; synchronization; rhythm

EFFECTS OF METRIC STRUCTURE ON MUSICAL ENSEMBLE COORDINATION: A STUDY WITH THE ST THOMAS CHOIR OF LEIPZIG

Peter E. Keller^{1*} and Rasmus Koenig²

¹ MARCS Institute, University of Western Sydney, Australia

² Music Cognition and Action Group, Max Planck Institute for Human Cognitive and Brain Sciences, Germany

* Correspondence: p.keller@uws.edu.au

Background

Ensemble musicians coordinate their sounds in terms of both timing and intensity in order to achieve good interpersonal synchrony and balance. Previous research has found that aspects of musical structure, including phrase boundaries and metric location, affect the precision of synchronization. However, while phrase entries and endings present obvious challenges for ensemble coordination, the role of metric location is less clear. Indeed, phrase boundaries are often aligned with strong metric locations (downbeats), making the effects of these different structural factors difficult to separate. Furthermore, little is known about the effects of phrase boundaries and metric location on how ensemble musicians balance the relative intensities of their sounds.

Aims

The current study investigated the effects of meter and phrase structure on synchrony and balance between singers in a choir. A specific goal was to examine these effects while controlling for possible co-variation between metric location and phrase boundaries (by using a piece with an anacrustic rhythm), as well as co-variation of these factors with other general and vocal-specific musical features (rhythmic duration, syllabic stress, and vowel sound).

Method

Sixteen boys from the St Thomas Choir of Leipzig (four sopranos, four altos, four tenors, and four basses) sang three performances of a chorale by J. S. Bach (*Du heilige Brunst*). This piece is in quadruple (4/4) meter, consisting of 11 phrases spanning 24 bars. Most phrases start on a weak metric location (with an anacrusis on an upbeat) and end on a strong metric location (the down beat or third beat of the bar). A conductor led the performances, which were sung in the presence of an audience. The boys' voices were recorded in separate channels with head-worn microphones.

Information about the timing (vowel onset) and intensity (maximum level in decibels) of notes at the start and end of each phrase of the chorale was extracted from the recordings. Ensemble synchrony was quantified by computing the standard deviation of onset times across the four boys within each voice type (soprano, alto, tenor, or bass) and balance was assessed by computing the standard deviation of the corresponding intensity values. Separate multiple regression analyses were run to evaluate how synchrony and balance were affected by metric location (four levels) and phrase boundaries (start vs. end) while controlling for effects of voice type, rhythmic duration, syllabic stress, and vowel sound.

Results

Metric location emerged as a unique predictor of ensemble synchrony and balance. For both measures, coordination increased with increasing metric strength (i.e. coordination was best on downbeats). Despite this qualitative correspondence between synchrony and balance, a partial correlation analysis (controlling for voice type) failed to detect a significant relationship between the two measures at the note-by-note level.

Conclusions

Metric structure influences ensemble coordination independently of phrase structure and other musical features. This influence extends beyond temporal coordination to include balance in sound intensity. Meter may thus function as a shared temporal frame of reference—anchored most securely at strong metric locations—that co-performers use to align their sounds on multiple dimensions.

Keywords

ensemble; synchrony; meter; singing; choir

Saturday
05 September 2015

Thematic session

Performance stress and anxiety

MUSIC PERFORMANCE ANXIETY: LEARNING FROM LONG-TERM DUOS

Fiammetta Facchini¹, Nancy Lee Harper^{2}, Filipa Lã², Anabela Sousa Pereira³, Ana Torres³, and Hara Trouli⁴*

¹ Conservatory “Pierluigi da Palestrina” of Cagliari, Italy

² Department of Communication and Art, University of Aveiro, Portugal

³ Department of Education, University of Aveiro, Portugal

⁴ International Society for the Study of Tension in Performance, London, UK

* Correspondence: harper@ua.pt

Background

Semi-structured interviews with six members of three professional long-term duos were made, recorded, and analyzed to determine how Music Performance Anxiety (MPA) was handled.

Aims

Because of scant literature in this area, it was aimed to learn first-hand how individuals in long-term duos handle MPA; to determine if MPA affected performance; and to determine what measures could be taken to alleviate MPA. Long term duos were viewed as a stable vehicle rather than occasional duos.

Method

Semi-structured interviews were given to three long-term professional duos (violin/piano; cello/piano; piano four hands). These interviews covered four areas to: (1) constitute a profile of the duo, its history, activity, and repertoire; (2) determine if any member of the duo suffered from MPA and if so to identify its cause; (3) determine to what extent the duo could talk about MPA and to what extent; and (4) discuss possible techniques used to solve MPA. The interviews were manually analyzed.

Results

It emerged that the problem of MPA was common to all musicians in this study. There was a noticeable difference between the duo that was older versus the two younger ones who were two generations removed. The staunch attitude that suffering was the price to be paid for being onstage and that talking about MPA was a “taboo” was the norm for the older duo. Another finding was that one member in each duo suffered more than the other. Thus, their coping mechanisms varied (denial, Yoga, Avatar, meditation, other), as did the origins of causes of MPA for each, which were sometimes related to non-musical or family matters, or to a traumatic/destructive personal relationship with another musician. Because these musicians were professionals and continued to develop outstanding careers, MPA did not have a negative effect on their performances. Each interviewee affirmed that it was much more stressful to perform as soloist than in duo, which, for them, served as a life “anchor.”

Conclusions

The responses of the six interviewees were quite different regarding MPA. Overall, three positions relative to the question of MPA were found: (1) a position of concern for the other; (2) an attitude of reticence about MPA that was seen as positive and helpful to the partner in performance; and (3) a position of acceptance of the other’s differences. While this study has given an inside perspective on MPA in professional duos, because of its limitations future interviews should be undertaken to further elucidate these findings.

Keywords

long-term duo; Music Performance Anxiety (MPA); violin-piano duo; cello-piano duo; piano four-hands

Acknowledgments

The team wishes to acknowledge the kind assistance of the participants in this study.

ONSTAGE IN FRONT OF ALL THESE PEOPLE: A GROUNDED THEORY OF ARTISTS' PERFORMANCE STRESS

Shulamit Mor^{1,2*}

¹ Department of Psychology, York University, Canada

² Canadian Centre for Performance Psychology, Canada

* Correspondence: smor@yorku.ca

Background

Artists' performance stress is a widespread phenomenon recognized by artists and researchers in psychology. Many anxiety-producing factors combine to make the performing arts one of the most stressful occupations, including the competitiveness of the field, the physical, emotional, and intellectual demands imposed by the performed pieces, the irreversibility of the performance situation, and the presence of audience and critics.

Aims

This study examined the subjective experience of classically trained artists who perform live on stage. The goal was to identify psychological factors associated with perceived experience of the performance situation in terms of performance stress.

Method

The author conducted intensive, non-directive inquiries of eight artists' experience on stage. The interviews were transcribed, coded, and systematically analyzed in accordance with the tenets of the grounded theory method.

Results

The analysis yielded a hierarchical model of artists' performance stress with the core category of the *Artist's Perceived Degree of Control*. This category subsumed two categories labelled *Efficacy* and *Impotence*. The category of *Efficacy* entailed, at the second level, the categories of *Positive Evaluation of the Situation* and *Mastery*. These categories were associated with the category of *Up Performance* at the final level. The category of *Impotence* was related to *Negative Evaluation of the Situation* and to the *Inner Demon* at the second level. These categories, in turn, were associated with the categories of *Stage Fright* and *State Terror*. Another category, which was not integrated into the model, was that of *Technique*. This category pertained to the different strategies employed by the artist when attempting to handle their performance stress, thus achieving some sense of control over the situation.

Conclusions

The model proposed herein is a cognitive phenomenological model. It has been argued that the level and quality of stress experienced by performers can be defined in terms of perceived control or loss of control. Artists who perceive performance situations as ones in which they have no control over the outcome (in terms of audiences reaction and their own level of mastery) will experience a great deal of negative stress. On the other hand, artists who perceive their performance situation as controllable both in terms of the overall reaction to their performance and their own perceived mastery will interpret their performance stress as a positive experience facilitating a masterful performance. Thus, the quality of performance stress depends upon every artist's subjective evaluation of the performance situation.

Keywords

performing artists; musicians; stage fright; performance anxiety; grounded theory

BUILDING PERFORMANCE CONFIDENCE IN THE DEVELOPING MUSICIAN

Margaret S. Osborne*

¹ Melbourne Conservatorium of Music, University of Melbourne, Australia

* Correspondence: mosborne@unimelb.edu.au

Background

Developing musicians are often exposed to a variety of performance experiences, from early informal experiences performing in front of family members, to performing with their school ensemble, to formal examinations from external examination bodies. For each student, these types of opportunities can trigger a range of emotions, thoughts, behaviors, and somatic responses which may or may not benefit their overall musical development. Among the most debilitating, but also potentially exhilarating, are the emotions experienced when performing music for others.

The instinctive desire to avoid performances perceived as threatening and thus anxiety-provoking is a maladaptive means to performance success, as this encourages a deterioration of musical skills which can spiral into a self-defeating and self-fulfilling prophecy of performance failure, reinforcing the primary fear of music performance anxiety (MPA). Conceptualisations of performance anxiety drawing from music and sports performance literature show that the experience of anxiety is not detrimental to performance per se. Rather, the facilitating or detrimental effect of anxiety on the quality of a performance depends on performance history, experience and skill in managing the spike of physiological arousal prior to and during a performance, the degree of musical skill or task mastery, and self-confidence. Building confidence improves the performer's perception of anxiety as conducive to good performance.

Aims

This paper reviews performance anxiety in child, adolescent, and young adult (tertiary student) musicians, outlining contributing factors, evidence-based assessments, and interventions.

Main contribution

Drawing from neurocognitive, sports, and music performance psychology literature, this paper outlines practical psychological strategies which will assist performers in managing the negative emotional and physiological symptoms of MPA, and build the positive emotions, mental skills, and behavioral choices which support effective performance in educational contexts.

Implications

Performers and pedagogues will be able to integrate these strategies into their learning and teaching practice to build performance confidence while supporting the achievement of musical excellence. These strategies are also likely to benefit performers across other disciplines.

Keywords

music performance anxiety; antecedents; assessment; intervention; psychological strategies

Thematic session Performance expressivity

ROLE OF MUSICAL FEATURES THAT ELICIT EMOTIONAL MUSICAL AUDIO

Shinji Miyamoto^{1} and Masanobu Miura²*

¹ Graduate School of Science and Technology, Ryukoku University, Japan

² Faculty of Science and Technology, Ryukoku University, Japan

* Correspondence: fln988@gmail.com

Background

Audio engineers have constructed computational systems called Emotional Rendering Systems (ERS), which render music to express emotions. Although an ERS is usually designed to use musical features to express emotions, to what extent the musical features elicit emotions is not clear.

Aims

This paper investigates the extent of emotional ratings elicited by musical features on musical audio.

Method

Four musical features (tempo, spectrum, sound pressure level [SPL], and SPL variability [SPLV]) were investigated, where SPLV was a feature concerning shapes of wave amplitude. Tempo, spectrum, SPL, and SPLV were alternated by time stretch, change of spectrum centroid, change of amplitude, and change of amplitude envelope variation, respectively. An evaluation experiment was conducted by asking subjects to listen to an original tune followed by tunes with altered musical features and to rate emotions on a two-dimensional scale of valence and activity using seven steps (-3 to 3). Six musical audio excerpts were chosen from three genres: popular, classical, and instrumental. We

set a variable M as the maximum rate of SPLV, on which people may naturally listen to the music with changed SPLV. The steps to change musical features are described below. Tempo was changed in seven steps with the ratios of 10/19, 10/16, 10/13, 10/10, 13/10, 16/10, and 19/10. Spectrum was changed in four steps: 0.5k, 1k, 2k, and 4k Hz. SPL was changed in seven steps: -9, -6, -3, 1, +3, +6, and +9 dB. SPLV was also changed in seven steps: 1/100, 33/100, 66/100, 1, $M/3$, $2M/3$, and M . Therefore, the presented stimuli totalled 150 patterns (6 tunes x 3 musical features x 7 patterns + 6 tunes x 1 musical feature x 4 patterns).

Results

Results of an investigation into emotional expression confirmed that the emotional expression increased depending upon the degree of exaggeration (or suppression) in all of musical features. To suppress the valence with 0.5 on the 2D plane, tempo with the ratio of 13/16, 550 Hz down of spectrum centroid, or 133/200 of SPLV was needed. To exaggerate the valence with 0.5 on the 2D plane, 0.55k Hz up of spectrum centroid, 6.4 dB up of SPL, or $10M/9$ of SPLV was needed. To suppress the activity with 0.5 on the 2D plane, tempo with the ratio of 11/14, 0.6k Hz down of spectrum centroid, 7.1 dB down of SPL, or 13/80 of SPLV was needed. To exaggerate the activity with 0.5 on the 2D plane, tempo with the ratio of 19/13, 0.6k Hz up of spectrum centroid, 4.7 dB up of SPL, or $2M/3$ of SPLV was needed.

Conclusions

Four musical features (tempo, spectrum, sound pressure level [SPL], and SPL variability [SPLV]) were confirmed to elicit perceived activity or valence. Moreover, interrelations between the four features were measured on a two-dimensional plane.

Keywords

musical features; emotional expression; activity; valence; musical audio

Acknowledgments

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TECHNOLOGY-ENHANCED EXPRESSIVE MUSIC PERFORMANCE LEARNING: A MACHINE-LEARNING-BASED TUTORING TOOL

Rafael Ramirez^{1*} and Sergio Giraldo¹

¹ Department of Information and Communication Technologies, Pompeu Fabra University, Spain

* Correspondence: rafael.ramirez@upf.edu

Background

To attain a high level of expertise in music education requires a long learning trajectory and intensive practice. Learning to play music is mostly based on the master-apprentice model in which the teacher mainly gives verbal feedback on the performance of the student. In such a learning model, modern technologies are rarely employed and almost never go beyond audio and video recording. In addition, the student's interaction and socialization is often restricted to short and punctual contact with the teacher followed by long periods of self-study, which often makes musical learning a lonely experience, resulting in high abandonment rates.

Aims

The general aim of this work is to study how we learn music performance from a pedagogical perspective and to create new assistive and interactive systems complementary to traditional teaching. In particular, we aim to design and implement methods and tools for music education with emphasis on expressive performance teaching. Music performance is not simply playing the right note at the right time. By providing such interactive tools we aim to complement traditional teaching methods.

Method

We have designed and implemented a tool able to generate expressive (i.e. human-like) music (violin) performances of monophonic melodies based on music score information. The tool is based on a predictive model trained using machine learning techniques applied to a database of performances recorded by an expert musician. The prototype consists of three components: (1) a melodic transcription component; (2) a machine learning component, which automatically learns an expressive performance model; and (3) a melody synthesis and visualization component, which generates expressive monophonic audio output from inexpressive melody descriptions (i.e. music scores), and provides a graphical interface for providing visual feedback to students about their performances.

Results

Regarding the expressive performance modeling component of the system, we have applied inductive logic programming techniques, in particular Tilde's inductive algorithm in order to automatically learn models for three note-level expressive transformations: duration transformation, onset deviation, and energy variation, for which we obtained correlation coefficients of 0.9, 0.83, and 0.87, respectively. Regarding the melody synthesis and visualization component, we have implemented a prototype which allows students to visualize the score, the expressive performance generated by the computational model, and their own performance. The prototype allows students to compare their performances with the target performance in terms of duration, onset, and/or energy in real-time. Preliminary feedback from students has been very positive.

Conclusions

We have designed and implemented a tool for teaching expressive music performance, which complements the traditional master-apprentice model. The tool is based on an expressive performance model induced using machine learning techniques applied to a database of performances recorded by an expert musician. The obtained model (for duration, onset, and dynamic expressive transformations) accurately predicts the expressive style of the expert musician, and the feedback synthesis and visualization interface of the tool has been positively evaluated by the students.

Keywords

expressive music performance; technology-enhanced learning; machine learning; music learning; computational modeling

Acknowledgments

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THE INFLUENCE OF EXPRESSIVE ACCOMPANIMENT ON A PLAYER'S EMOTION AND EXPRESSIVE NUANCES IN A PERCUSSIVE DUO PERFORMANCE

Takaaki Sakino¹, Takayuki Hamano², Makiko Sadakata³, Masaki Matsubara⁴, Takuro Shibayama⁵, Hidefumi Ohmura⁶, and Hiroko Terasawa^{4}*

¹ Graduate School of Library, Information and Media Science, University of Tsukuba, Japan

² Graduate School of Fine Arts, Tokyo University of the Arts, Japan

³ Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands

⁴ Faculty of Library, Information and Media Science, University of Tsukuba, Japan

⁵ Division of Information System Design, Tokyo Denki University, Japan

⁶ Department of Information Science, Faculty of Science and Technology, Tokyo University of Science, Japan

* Correspondence: terasawa@slis.tsukuba.ac.jp

Background

Why is performing music with friends fun and exciting? Does emotional contagion occur in a performance? And do the emotional experience and the nuances of the performed music co-influence each other? In order to answer these questions, we explored how musical emotion is perceived/shared, and how the musical nuances are changed, in a collaborative percussion performance. Terasawa and colleagues provided a theoretical framework of how performers exchange emotions in their ensemble performance, which predicted the following hypotheses: when an accompaniment is expressive, a performer would (1) perform more expressively, and (2) feel stronger emotion.

Aims

This study investigated the relationship between performance nuances (i.e. timing and dynamic deviations from scores) and the perceived/felt emotions during the performance of a percussion piece.

Method

For stimuli, a body percussion piece for four performers, *RockTrap* by J.Schinstine, was shortened and simplified for two drum players. Three types of MIDI accompaniment were created: Expressive (i.e. recording of a performance by a professional percussionist), non-expressive (i.e. with score timing and flat dynamics), and metronome ticks. All conditions were presented at slow (90 BPM) and fast (120 BPM) tempi, making six accompaniment stimuli. Eight participants performed the other part of the piece with the accompaniments, and the performance data (timing and dynamics) were recorded. After each performance, participants reported their felt and perceived emotions according to Russell's circumplex model of affect.

Results

In general, a performance with expressive accompaniment tended to invite larger timing deviations than the other conditions. For the felt emotion, arousal level increased with accompaniment in the faster tempo, but we did not find a significant effect on the valence level.

Conclusions

The present results suggested that when accompaniments were expressive, performers tended to deviate more from the score timing. Furthermore, faster and more expressive accompaniment was associated with a stronger arousal response. This is in line with the hypothesis posed by Terasawa and colleagues. We are planning to extend this approach to duet performances.

Keywords

ensemble performance; percussion; musical emotion; communication; performance nuance

Acknowledgments

This project was supported by JSPS KAKENHI Grant Number 23720068.

Thematic session Approaches to improvisation

CREATIVE PROCESSES AND SHARED UNDERSTANDING IN FREE JAZZ IMPROVISATION: A CASE STUDY

Amandine Pras^{1}, Michael Schober¹, and Neta Spiro²*

¹Department of Psychology, New School for Social Research, USA

²Centre for Music and Science, Faculty of Music, University of Cambridge, UK

* Correspondence: amandine.pras@gmail.com

Background

A single case study suggested that a fully shared understanding of what happened may not be essential to jazz improvisation: that performers can agree with an outside listener more than with each other, and that there can be different types of disagreement. In that study, the duo (saxophone and piano) improvised on a jazz standard; they had never met or heard each other play and could not see each other throughout the study. To what extent are these findings also observable in other contexts: when performers know of each other's music, can see each other, and when performing music of another genre? And to what extent is understanding shared with and among outside listeners? What kinds of knowledge and what aspects of cultural background are important for the creative processes involved?

Aims

This case study investigated free jazz musicians' creative processes and the extent and nature of shared understanding when they improvised together for the first time. It also observed the extent to which other free jazz musicians within the same community agreed with the performers' characterizations when listening to their recorded performance.

Method

As part of an ethnographic study of the free improvisation scene in New York, a saxophonist and pianist of international renown who knew each other's work but who had never performed together were interviewed individually about their musical background and their improvisational practice.

Subsequently the two performers were recorded while improvising freely together for about an hour. Following the method in Schober and Spiro, immediately after the improvisation each performer was interviewed separately about the just-completed improvisation, first from memory and then while listening to two five-minute excerpts of the recording (from the opening and half-way through the performance) so as to prompt specific and detailed commentary. Two free jazz musicians from the same performance community listened to, and were interviewed about, these ex-

cerpts. Statements were extracted from all four interviews, and all participants (the performers and the two listeners) rated the extent to which they endorsed each anonymized statement.

Results

The ethnographic interviews detailed how the saxophonist and the pianist saw the development of their individual musical languages and their ability to react to sounds by instinct with minimal conscious analysis and maximal listening, building upon and departing from their jazz and classical musical training in different communities and countries. Our analyses of the performers' and listeners' endorsement rates of each other's statements built on the ethnographic interview evidence about these performers' cultural practices and the context for their creative processes, developing a fuller picture of shared understanding between performers in a free improvisation context.

Conclusions

The findings in this study provide evidence about the patterns of shared understanding of performances and community norms in a free jazz improvisation setting. The aim in charting and quantifying these differences is to gain new understanding of how the mental lives of performers and audiences may vary and be similar across different genres, performers, audiences, and performance conditions.

Keywords

free improvisation; shared understanding; intersubjectivity; creative process; listening

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TO WHAT EXTENT DO LISTENERS SHARE PERFORMERS' INTERPRETATIONS OF JAZZ IMPROVISATIONS?

Michael F. Schober^{1*} and Neta Spiro²

¹ Department of Psychology, New School for Social Research, USA

² Centre for Music and Science, Faculty of Music, University of Cambridge, UK

* Correspondence: schober@newschool.edu

Background

As one case study by Schober and Spiro demonstrated, jazz improvisers can substantively disagree with each other's interpretations and characterizations of what happened in a performance, and they can agree with an outside listener more than they agree with each other. How general are these phenomena? To what extent do non-performing listeners understand a performance in the same way as the performers do? How much variability in hearing is there across an audience; do listeners across a range of musical experience agree with each other's interpretations?

Aims

The aim of the current study was to explore the extent to which a large set of listeners share understanding with a performing duo, and with each other, of what happened in a set of three improvisations on a single jazz standard. We also explored potential relationships between listeners' interpretations and their musical backgrounds.

Method

Musicians (with jazz and non-jazz backgrounds) and non-musicians were recruited to participate in an intensive online study for a \$20 incentive. The 239 listeners who provided complete data listened to the three improvisations by a sax player and pianist on *It Could Happen to You*. They provided ratings of their endorsement of 49 general statements about the quality and character of each performance and the performers, and also 24 specific statements generated by the performers and an outside listener, half of which the performers had fully agreed upon and half of which they had disagreed upon. For each statement listeners could also write in optional comments. Listeners finally answered a battery of questions about their own musical experience and interests.

Results

Although some music-analytic statements garnered substantial endorsement (e.g. "The pianist set the tempo," "At about 2:10 the sax plays a classic wrap-up cliché"), other statements about judgments and performers' intentions generated much less agreement (e.g. "When the pianist played in the same range as the sax at about 1:37, the pianist was stepping on the sax's toes"). No statement was universally endorsed, and the very same statement could generate

opposing write-in comments. Listeners endorsed statements that the performers had agreed upon much more than statements that the performers had disagreed upon, even though the statements gave no indication of performers' levels of agreement. Nonetheless, overall very few listeners' ratings matched the performers' own ratings of these statements; only 15 of 239 listeners' ratings reached a level of interrater agreement (Cohen's kappa) with the sax player's ratings that was greater than chance, and only one listener's with the pianist's. Ratings by listeners reliably fell in different clusters depending on whether they had reported being jazz players or not, and sax players or pianists, but these differences were far from absolute.

Conclusions

These findings begin to quantify the range of interpretation across a listening audience, and demonstrate how different listeners' interpretations can be from performers'. Although we find some evidence that musician listeners' instruments and preferred genre affected their interpretations, there was still substantial variability; listeners with similar backgrounds could hear the same performance radically differently.

Keywords

listeners; audience; shared understanding; interpretation; improvisation

Acknowledgments

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FACILITATING IMPROVISATION THROUGH GROUP EAR PLAYING IN HIGHER EDUCATION

*Maria Varvarigou¹**

¹ School of Music and Performing Arts, Canterbury Christ Church University, UK

* Correspondence: maria.varvarigou@canterbury.ac.uk

Background

While ear playing has been recognized as a key contributor to musical literacy and the development of improvisation skills, no research study to date has explored how ear playing from recordings within a group setting could support western classical musicians' development of improvisation skills in Higher Education.

Aims

This paper reports on the strategies that first year undergraduate musicians (N=46) adopted when they were asked to copy music by ear from recordings in small groups and on how these strategies supported their development of improvisation skills, creative processes, and general musicianship.

Method

Data were collected from students' weekly individual reflective logs (n=194), end-of-program feedback forms (n=36), and through interviews with four students. The analysis focused on thematic discovery from the transcripts and was achieved through open, axial, and selective coding.

Results

The findings revealed that the students employed individual improvisation strategies including changing the rhythm, missing notes out, adding ornaments based on scales, and changing the key, as well as group strategies such as altering the pieces' structure and "harmonizing and fitting with others." They also engaged in collective experimentation through play, which supported the less confident musicians to join in improvisation and to make music as a group. Moreover, the students talked extensively about how the choice of repertoire impacted on group improvisation and experimentation. Finally, the students reported that GEP developed their listening skills, it nurtured their ability to harmonize melodies and to listen for harmony, it helped them gain a better knowledge of their instrument, it developed their creativity, and it helped them to feel more confident about improvising.

Conclusions

This study proposes that group ear playing from recordings successfully supports Higher Education students' improvisation skills, it introduces classically trained musicians to new ways of interacting with one another, and it nurtures a lifelong enjoyment of group music making.

Keywords

group ear playing; improvisation strategies; collaborative learning; Higher Education; collective experimentation

Symposium

Getting past the notes

GETTING OFF THE GROUND: BUILDING PERFORMANCE SKILLS IN BEGINNING MUSIC LEARNERS WITH MULTIPLE MODES OF INSTRUCTION

Andrew H. Homburg^{*}

¹ Department of Music, Missouri State University, USA

* Correspondence: andrewhomburg@missouristate.edu

Background

Instructors of beginning musicians often focus on increasing technical skills. While technical skills are important, focusing on musicianship and expression are also important. Performance hierarchy dictates young musicians must first be accurate before they can be expressive. However, young musicians are often more able to be expressive than accurate. Furthermore, techniques which increase accuracy are largely unknown or ignored.

Aims

By employing multiple modalities in elementary/general music instruction, beginning learners of music experience music in many ways. The visual, aural, and kinesthetic learner can all benefit from exposure to the other modes. Employing multiple modalities allows the instructor to reinforce accurate singing while building expression in the burgeoning musician.

Main contribution

Pitch accuracy, breathing, rhythmic integrity, and expression can all be effectively learned by the beginning musician. This portion of the symposium will focus on a practical approach to getting beginning choirs from ordinary to great in a short amount of time.

Implications

Young musicians are too often allowed to perform below their musical capacity. Using multiple modes to reach and instruct beginning students combats musical mediocrity, and increases enjoyment for the student and teacher.

Keywords

music performance; music instruction; beginning musicians; modes of instruction; elementary choir

Acknowledgments

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GETTING TO INSTRUCTION THAT WORKS: COMPARING AND CONTRASTING ENSEMBLE AND APPLIED INSTRUCTION

Timothy P. Farrell^{*}

¹ Department of Music and Performing Arts, University of Nebraska–Kearney, USA

* Correspondence: farrelltp@unk.edu

Background

With the influence of technology and media, our fast-paced society has the ability to have instant access to mass amounts of information. It should come as no surprise, then, that recent studies have shown that the method in which students are currently learning may be quite different from previous generations. In a world where the answer to nearly any question is one internet search away, people have come to expect immediate results. Music students are not immune to this type of thinking. In the process of mastering one's instrument, however, instant answers seldom occur.

If the goal of music educators is to teach and demonstrate a set of skills that aim to enable students to develop into quality musicians and performers, the current attention span of young people can often make this seem impossible. How can teachers expect their students to stay focused and learn to pay attention to detail in lessons and large and small ensembles when the rest of the world offers quick fixes and easy distractions? Should music teachers be expected to adjust their teaching styles to fit into this new normal, or should they continue to teach in traditional ways? And, with the challenges they are facing, are music educators succeeding in teaching their students how to develop critical listening and thinking skills in and outside the classroom?

While our society may be rapidly changing and students may be expecting different teaching styles, it is crucial that music educators ultimately maintain high levels of performance standards in order to continue to inspire young people. While instant answers and shortcuts do not apply to music education, each teaching setting does offer proven methodologies for successful learning.

This symposium will focus on similarities and differences of teaching to today's students in the settings of individual lessons and large and small ensembles. It will address issues of whether to adjust teaching styles to fit the mold of a fast-paced, technology-driven world, or to remain true to traditional teaching methods, as well as offer teaching ideas involving visual, auditory, and kinesthetic principles in the field of music.

Aims

This presentation aims to discuss proven learning methodologies in music education and how these various learning tools can be used in different musical settings to empower students with limited attention spans to strive to achieve optimal performance standards.

Main contribution

The main goal of this presentation is to share strategies that will bring positive results to students who have come to expect teaching styles from their instructors that mirror what a technology-driven world is offering them. Likewise, it is important to inspire music teachers to maintain high standards by finding ways to incorporate new technology, philosophies, and scientific research about the ways our minds process information in order to achieve the best possible results. Ideas will be offered in areas of helping students to develop critical listening and thinking skills for students that will bring them a lifetime of self-awareness.

Implications

This research will empower music instructors to use effective teaching strategies, current by today's standards, within different musical settings that bring satisfaction to both the instructor and the student.

Keywords

music instruction; jazz ensemble; applied lessons; modes of instruction; ensemble instruction

GETTING BEYOND THE PAGE: THE USE OF MULTIPLE MODES OF INSTRUCTION WITH ENSEMBLES OF VARYING AGES AND MUSICAL EXPERIENCE

*Mark E. Lucas¹**

¹ Department of Music, Bethany College, USA

* Correspondence: lucas@bethanylb.edu

Background

The Bethany Oratorio Society (BOS) is a community chorus and orchestra comprising approximately 300 singers and instrumentalists. For the past 133 years the BOS has performed Handel's *Messiah* each Holy Week, making it the longest running continuous tradition of performance in the United States. Since 1929 the ensemble has also performed *Passion According to St. Matthew* by J.S. Bach each Good Friday.

Aims

This portion of the symposium will focus on the use of various modes of instruction to increase the level of musicianship of the Bethany Oratorio Society in rehearsals and performances of Handel's *Messiah* and Bach's *Passion According to St. Matthew*.

Main contribution

Musicians in the Bethany Oratorio Society range in age from 16 years to over 80 years of age. Music teachers and other semi-professional musicians make up a small portion of the ensemble, but the vast majority of participants are

not professional, or even semi-professional musicians. This makes the use of multiple modes of instruction of the utmost importance.

Implications

This portion of the symposium will demonstrate the use of multiple modes of instruction, including bodily-kinesthetic, musical, linguistic, logical, mathematical, and others. Specific examples will be given showing improvement in musicianship amongst singer performing these masterworks after utilizing these multiple modes of instruction.

Keywords

choir; orchestra; modes of instruction; performance; oratorio societies

Thematic session Models of performance

COMPUTATIONAL MODELING OF ORNAMENTATION IN JAZZ GUITAR MUSIC

Sergio Giraldo^{1} and Rafael Ramirez¹*

¹ Department of Information and Communication Technologies, Pompeu Fabra University, Spain

* Correspondence: sergio.giraldo@upf.edu

Background

Computational modelling of expressive music performance deals with the analysis and characterization of performance deviations from the score that a musician may introduce when playing a piece. Most of the work in expressive performance analysis focuses on duration and energy manipulations, and has mainly studied classical piano music. However, very little work has been dedicated to study ornamentation in popular music. Specifically, in jazz music ornaments are an important part of expressive performance and they are seldom indicated in the score, i.e. it is up to the interpreter when to add/substitute groups of notes in the score. Musicians add ornamentations based on melodic, harmonic, and rhythmic contexts, as well as on their musical background. Furthermore, the categorization of ornaments in classical music (e.g. appoggiaturas, trills, mordents, turns, etc.) does not always apply in jazz music, as melodic embellishment in jazz lies in between archetypical ornamentation and free improvisation.

Aims

In this work we present a system to automatically recognize and synthesize ornaments in jazz guitar music. Our aim was to automatically obtain an ornamented rendition of a score by inducing an expressive performance model from a human player. By comparing the similarity between a sequence of score notes and its corresponding sequence of performed notes, we automatically obtained for each performed note (or group of notes) its corresponding parent note in the score, and created a database of ornamentations. We then applied machine-learning techniques to learn an expressive ornamentation model in the style of a particular guitarist.

Method

We obtained a MIDI-like machine representation of 27 jazz standard scores and their respective performance audio files, recorded by a professional jazz guitarist. We used dynamic time warping to match the performance and score note sequences and compare this matching with annotations by human experts. For each note in the in the score, we extracted a set of melodic descriptors and applied machine learning to generate models to classify score notes into ornamented and non-ornamented notes. Ornamented notes, together with the music context in which it was performed, were included in a database. When a note was classified as ornamented by the model, we automatically selected a suitable ornament (according to similar music contexts) from the annotated ornamentation database in order to synthesize an ornamented performance of a particular score.

Results

Quantitative evaluation was performed using a *leave one out* approach. Each song on the data set was used as test data and the rest were used as training data. This “song cross fold validation” scheme was performed for the 27

tunes, obtaining an average accuracy of 81.53% for the test set and 83.8% for the training set using a *decision tree* classifier. Qualitative evaluation was performed by music experts based on listening ratings for synthesized pieces.

Conclusions

We implemented a system for automatically recognizing and synthesizing ornamentations in jazz guitar music. We have used a data set of 27 audio recordings of jazz standards performed by a professional guitarist. We have applied dynamic time warping to align the score with the performance of the musician, and match notes of the performance with the corresponding parent notes in the score. Based on the alignment, we have generated a database of embellishments, annotated with the musical context in which they were performed. We have trained machine learning models to classify score notes in to ornamented or not-ornamented and for the former we have apply the k-nearest-neighbour algorithm to find, given a particular score note, the most suitable ornament in the ornament database. Evaluation results show that our approach is able to produce meaningful ornamentation models in order to automatically generate human-like ornamented performances.

Keywords

expressive performance modelling; machine learning; dynamic time warping; ornament modeling; Jazz guitar

Acknowledgments

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CHOREOGRAPHIC EDUCATION FOR CONTEMPORARY DANCE USING 3D MOTION DATA

Bin Umino^{1}, Asako Soga², Yuho Yazaki², and Motoko Hirayama³*

¹ Faculty of Sociology, Toyo University, Japan

² Graduate School of Science and Technology, Ryukoku University, Japan

³ Faculty of Health and Sport Sciences, University of Tsukuba, Japan

* Correspondence: umino@toyo.jp

Background

Choreographic skills in contemporary dance are normally taught to students at universities as a top-down approach by using feelings, emotions, narratives, or music. However, a bottom-up and non-expressionistic approach should also be taught so that the students can develop their own artistic creativity, although it is not an ordinary way of choreographic education.

Aims

The authors have been working on dance education and creation using 3D motion data that were captured from performances by professional dancers. This study aimed to introduce a specific teaching method for choreographic skills in contemporary dance by utilizing an automatic composition software using 3D motion data, which is called the "Body-part Motion Synthesis System" (BMSS). The method targets undergraduate and postgraduate students who are studying contemporary dance choreography.

Method

The software BMSS is based on the concept of "analytic-synthetic choreography," in which 3D motion data of dance movements are segmentalized into elemental motions and synthesized into new movements. The analytic-synthetic choreography is an algorithm to compose original dance movements in the way of a bottom-up and non-expressionistic approach. The BMSS version 2 (BMSS2) has 40 elemental dance motions. It allows users to compose a short dance movement according to the initial settings by users. Users can interactively add a favorite body-part motion in a desired timing. The BMSS version 3 (BMSS3) has 118 elemental dance motions. It allows users to compose as many short dance movements as they like using an automatic composition algorithm. Both of them run on a tablet with touch input and simulate dance movements as 3D CG animation with an avatar.

Results

An experiment was conducted to test the usability of the BMSS for choreographic education. The 48 examinees consisted of 18 students of University of Tsukuba in Japan, 14 students of Middlesex University in the UK, and 16 students of University of California, Irvine in the US. They were requested to create their own dance pieces by selecting and connecting the short movements composed by the BMSS2 or BMSS3. 23 students used BMSS2 and 25 students used BMSS3. At the end of the experiment they were requested to fill in a questionnaire to evaluate the software's usability. The 48 videos of the student performances were shown to four dance critics to evaluate their creativity. The

results show that the students evaluated the software as useful in general for learning choreography of contemporary dance and the critics evaluated the performances as creative enough in general.

Conclusions

The software BMSS was developed as an e-learning tool for learning choreography. The authors verified that the teaching method using the BMSS is effective for teaching choreographic skills in contemporary dance at universities.

Keywords

dance education; contemporary dance; dance choreography; 3D motion data; 3D CG animation

ALGORITHMS CAN MIMIC HUMAN PIANO PERFORMANCE: THE DEEP BLUES OF MUSIC

Emery Schubert^{1}, Antonio Rodà², Sergio Canazza², and Giovanni De Poli²*

¹ School of the Arts and Media, University of New South Wales, Australia

² Department of Information Engineering, University of Padova, Italy

* Correspondence: e.schubert@unsw.edu.au

Background

One of the landmarks for progress in the area of automated music performance has been the RENCON series, where a number of researchers present algorithms that play established piano compositions, and listeners are asked to rate the playback from which a winner is determined. However, have the algorithms used for automated music playback reached a point where the listener can no longer distinguish between human and robot performer? Some recent, but limited, evidence suggests that the typical listener is no longer able to distinguish between an algorithm and a human performance. But we have not cited direct evidence.

Aims

In this study we aimed to answer the question: are algorithmic systems able to generate music performances that cannot be distinguished from a human performance of the same piece?

Method

172 participants with a wide range of music playing backgrounds participated in the study. They rated sound recordings of an extract of piano music by Kuhlau, one played by a human, six generated by algorithms (two of which consisted of a mechanical, fully quantized, “unexpressive” rendering), and another where the parameters were set to be “unmusical.” Furthermore, one of the algorithmic performances was repeated, making a total of eight performances to rate. Presentation order was randomized for each participant. Participants rated how much they agreed with the statement “the performance is by a human” for each of the eight performances. They were asked to explain their response and to indicate their confidence in the rating.

Results

The mechanical performance was rated lowest, but the human performance was rated as statistically identical to the other stimuli, including the unmusical rendering. There were no differences between ratings made by classical piano experts and lay listeners, and despite this, the musicians produced significantly higher confidence levels. Qualitative analysis revealed six broad themes that contribute to judging whether a piece appears to be human, labeled halo, expressive, imperfection, empathy, sound-based, and intuition. This analysis, too, did not reveal significant differences for the human versus algorithmic stimuli.

Conclusions

Matters of design and reliability will be discussed, including the number of stimuli to use to optimize concentration for the task (four performances). This paper presents the first evidence that we are aware of which systematically demonstrates that algorithm generated performances of piano music can be indistinguishable from human performances, suggesting some parallels with the 1990s victory of the Deep Blue computer over the world champion (human) chess player.

Keywords

automated piano performance; music judgment; music competitions; concentration; musical Turing test

Acknowledgments

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Thematic session

The performer's body

HEART-RATE VARIABILITY AND COMPLEXITY IN LIVE VIOLIN PERFORMANCE

Haruka Shoda^{1,2,3*}, Mamiko Sakata¹, and Aaron Williamon³

¹ Department of Culture and Information Science, Doshisha University, Japan

² Japan Society for the Promotion of Science, Japan

³ Centre for Performance Science, Royal College of Music, UK

* Correspondence: hshoda@mail.doshisha.ac.jp

Background

According to Zajonc's social facilitation theory, performance is facilitated and inhibited by the presence of others for easy and difficult tasks, respectively. If this theory were applicable to music performance, the performer's responses in live performance would differ as a function of difficulty of the piece. Williamon and colleagues showed that a single pianist's heart-rate complexity decreased in the presence of an audience, particularly in performing the most challenging sections of a piece. The replicability of the results should be explored by multiple performers across easy and challenging pieces.

Aims

We investigated effects of performing context (i.e. audience-present and audience-absent) and the difficulty of the piece (i.e. easy vs. challenging) on the violinist's heart-rate variability and complexity. We predicted that the violinist's sympathetic nervous response (i.e. the LF/HF ratio) would increase but the physiological complexity (i.e. multiscale sample entropy) would decrease in the stressful condition: performing the challenging piece in front of the audience.

Method

10 violinists aged 21-38 (M=26.20, SD=5.79) performed two pieces (Gossec's *Gavotte in D Major* and Paganini's *Caprice Op. 1 No. 24 in A minor*) in the audience-present and the audience-absent conditions. The *Gavotte* and *Caprice* were chosen as technically easy and challenging pieces, respectively. In each condition, the violinist's electrocardiogram (ECG) was recorded by a small sensor (WHS-1, Union Tool), which was converted into RRI time-series. Based on the generated RRI time-series, we computed the mean heart rate, the CVRR, the LF and HF components of heart-rate variability, and the heart-rate complexity indices by multiscale entropy analysis.

Results

2 (piece) × 2 (performing context) linear mixed-effects models yielded significant two-way interactions for the mean heart rate, the CVRR, and the sample entropy with scale factor 3. Neither significant effects of performing context were shown in the heart-rate variability indices (i.e. LF/HF ratio, HF/Total ratio) nor the sample entropies with scale factors 1 and 2. According to the post hoc tests, the mean heart rate and the CVRR were significantly higher and the sample entropy (scale factor 3) was significantly lower in the audience-present than the audience-absent condition only for the performance of Paganini's *Caprice*. The sample entropy (scale factor 3) increased in the audience-present than the audience-absent condition in the performance of Gossec's *Gavotte*. These results indicate that the physiological responses between two performing contexts were more distinguishable by the coarse-graining index of sample entropy (i.e. scale factor 3) than the conventional heart-rate variability index (i.e. LF/HF ratio, HF/Total ratio).

Conclusions

The decreased sample entropy in front of the audience was replicated in performing the technically challenging piece (i.e. Paganini) in line with Williamon *et al.* The increased sample entropy in the performance of the *Gavotte* was a novel finding, suggesting that the violinists felt less stressful in front of the audience. These results are the first physiological evidence of social facilitation and inhibition in the domain of music performance.

Keywords

violin performance; live performance; social facilitation; heart-rate variability; multiscale entropy analysis

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TONE REPETITIONS IN PERSIAN AND KURDISH SINGING: IN SEARCH FOR CACCINI'S TRILLO

Hama Biglari^{*} and *Lars Berglund*[†]

[†] Department of Musicology, Uppsala University, Sweden

^{*} Correspondence: hama_biglari@hotmail.com

Background

Contemporary voice science has run into a dilemma regarding tone repetitions (reiteration of the same tone) and alternations (repeatedly going up and down between two tones) as performed by Western singers. Both opera and early music singers perform tone repetitions with an abductory-adductory glottal motion pattern: adduction (the arytenoids being pushed together) during the sung tone, and abduction (the arytenoids being apart) between the tones. Alternation, on the other hand, cannot be sung with the same abduction-adduction pattern; the antagonistic action of the Cricothyroid (CT) and Thyroarytenoid (TA) muscles imply that the interleaving abduction must be omitted. However, this contradicts the early Italian Baroque sources (Caccini and Bovicelli) which clearly advocate that trillo and gruppo must be practiced and performed in the same way.

Rapid tone repetitions and alternations are common in traditional Persian and Kurdish singing. Those singers somehow manage to avoid the Western physiological dilemma when singing those repetitive ornaments.

Aims

The aims were (1) to show how tone repetitions and alternations can be sung with the same phonation pattern and (2) to help Middle Eastern singers practice and perform early 17th century Italian songs with their traditionally acquired eastern phonation and improvised ornamentation.

Method

Audio and electroglottograph (EGG) signals were recorded from stylistically representative male and female singers singing typical song excerpts from each tradition as well as isolated tone repetitions and alternations. Voice source parameters and formant frequencies (F1 & F2) were measured from inverse filtering of the audio signal, using the custom made DeCap (Svante Granqvist, KTH) and the commercial Soundswell™ softwares. Fundamental frequency F0 was measured from the EGG signal using the Soundswell CORR tool.

Results

Tone repetitions were sung with continuous adduction, i.e. without abduction episodes between the repeated melody tones which were sung in modal voice with interleaving short falsetto episodes. Thus, F0 quickly jumped up to a peak before the onset of the next melody tone. This phenomenon has been observed also in previous studies. Since alternations are also sung with this type of continuous adduction, the antagonism between the CT and TA muscles is no longer relevant.

Conclusions

It seems reasonable to consider these findings in order to reach a new interpretation of Caccini and Bovicelli regarding trillo and gruppo. Also, by considering Bovicelli's notation for trillo, with short grace notes preceding each repeated tone, we should allow ourselves to seek an interpretation where the short grace notes correspond to the falsetto episodes which in fact are a kind of very short falling appoggiaturas. Then it would also be aesthetically and musically interesting to apply eastern singing technique with continuous adduction in order to open new doors in our time when we approach the vocal repertoire of the early Italian Baroque period.

Keywords

trillo; adduction; arytenoids; Persian; Kurdish

ELECTROMYOGRAPHIC ACTIVITY OF FACIAL MUSCLES IN FLUTE PLAYING: MUSCLE ACTIVITY AND ITS COOPERATIVENESS

Kenko Ota^{1} and Masakazu Aoki²*

¹ Electrical and Electronics Engineering, Nippon Institute of Technology, Japan

² Electrical and Electronics Engineering, Tokyo University of Science, Japan

* Correspondence: otakenko@nit.ac.jp

Background

This research is fundamental for the self-education of flute playing. The flute is a musical instrument upon which is difficult to progress. The difficulty in playing the flute is not to learn the fingering but to emit the right sound. For amateur players the difficulty in emitting the right sound is that they do not know how to form the appropriate embouchure. Hence, this research clarifies the facial muscles related to form the appropriate embouchure based on the performance of professional players.

Aims

The aims of this research were as follows: (1) to investigate the appropriate activity of facial muscles for flute playing; (2) to investigate the cooperativeness of facial muscles in flute playing; and (3) to investigate differences in muscle activity between professional and amateur players.

Method

In this research, EMG (Electromyography) was employed for recording the electrical activity of facial muscles in flute playing. EMG can record 8-channel electrical activities simultaneously. Measured facial muscles were levator anguli oris (LAO), orbicularis oris superior (OOS), orbicularis oris inferior (OOI), depressor anguli oris (DAO), and platysma (PLA). Two subjects were measured. One subject was a professional who had played the flute for 20 years. The other subject was an amateur player who had played the flute for one year.

First, subjects carried out a measurement of maximum voluntary contraction (MVC). Subjects were required to play a musical note (e.g. A6) with maximum blowing pressure.

Second, subjects carried out a measurement of facial muscle activity. Subjects played three musical notes (A4, A5, and A6) for a duration of five seconds each. Before the each note, there were two periods for rest and for preparation. The duration of each rest period was 10 seconds.

The recorded EMG activity was converted to RMS (Root Mean Square) values and EA (Electrical Activity) values. RMS value was converted to %MVC in order to compare muscle activities between different players. EAs were converted to correlation coefficients in order to investigate the cooperativeness between muscles.

Results

%MVCs of OOS and LAO of the professional player became larger when changing to a higher pitch. Correlation coefficient between OOS and LAO of the professional player were the largest among all combinations of muscles. %MVCs of OOI and DAO of the professional player were maintained constant regardless of pitch. Correlation coefficient between OOI and DAO of the professional player were the second largest among all combinations of muscles. Compared with subjects, there was remarkable difference in muscle activities of LAO and OOI.

Conclusions

This research investigated the appropriate activity of facial muscles for flute playing. The muscle activities of OOS and LAO were cooperative. OOS and LAO were related to changes in pitch. OOI and LAO were cooperative, but OOI and DAO were not related to pitch change.

Keywords

electromyogram; flute playing; facial muscles; orbicularis oris; levator anguli oris

Keynote paper

THE POWER OF SIMPLICITY: A FAST-AND-FRUGAL HEURISTICS APPROACH TO PERFORMANCE SCIENCE

Markus Raab^{1,2}*

¹ Institute of Psychology, German Sport University Cologne, Germany

² School of Applied Sciences, London South Bank University, UK

* Correspondence: raab@dshs-koeln.de

Background

Performance science is a fairly new, multidisciplinary field that integrates performance domains such as sports, medicine, business, and the arts. In these domains performance psychology may help to describe, explain, and predict behavior when information, cognitive resources, and time are limited and peak performance is demanded.

Aims

To give performance science's many branches a structure and its research a direction, it requires a theoretical framework. Because performance science deals mainly with situations of uncertainty rather than known risks, the needed framework can be provided by the fast-and-frugal heuristics approach.

Main contribution

According to the fast-and-frugal heuristic approach, experts learn to rely on heuristics in an adaptive way in order to make accurate decisions. The program has three goals: the descriptive study of the heuristics in the cognitive "adaptive toolbox"; the prescriptive study of their "ecological rationality", that is, the characterization of the situations in which a given heuristic works; and the engineering study of "intuitive design", that is, the design of transparent aids for making better decisions.

Implications

Based on evidence from the fast-and-frugal heuristic approach (e.g. medicine) and my own research (e.g. sports, music), the fast-and-frugal heuristics approach as a framework can aid performance science in developing a structured research program. I illustrate implications for talent selection, talent development, and effects of embodiment—that is, how sensorimotor information can inform complex behavior in music, sport, general problem solving, and decision-making.

Keywords

decision-making; choice; sport; medicine; performance

Faculty of Science and Technology, Ryukoku University, Kyoto

With its roots dating from 1639, Ryukoku University is one of the oldest Universities in Japan. Founded on the principles of Jodo Shinshu Buddhism, the University today has seven faculties ranging from the humanities to the natural sciences. Boasting a student population of approximately 20,000 spread over three unique, attractive and accessible campuses in the ancient capital of Kyoto and neighboring Shiga, the university continues to preserve the past while at the same time press the boundaries of knowledge into the future.

The Faculty of Science and Technology is the first natural science faculty at a Buddhist affiliated university in Japan. We emphasize a harmony between science and people in today's rapidly computerized and internationalized age. Our educational philosophy is to train scientists and engineers that can contribute to advancing technology, and spiritual and cultural wealth.

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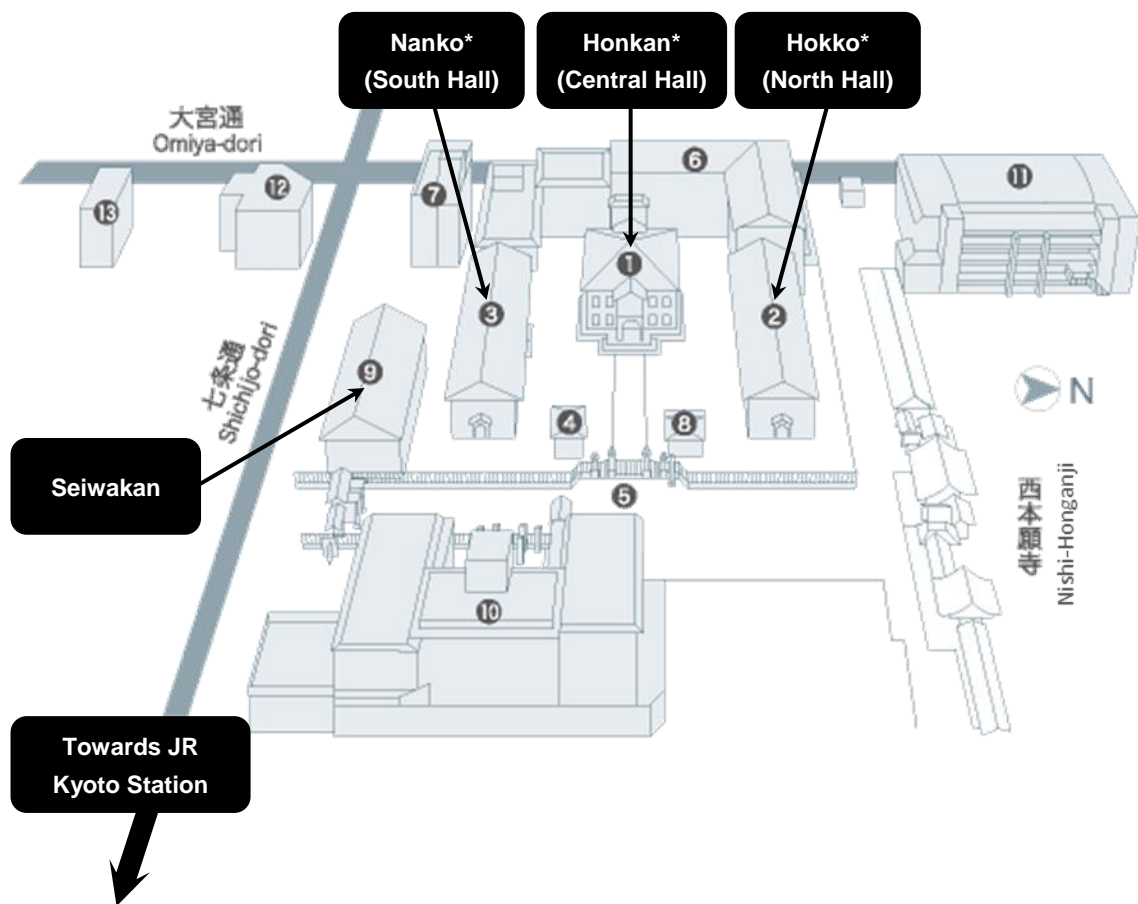
Centre for Performance Science, Royal College of Music, London

The Royal College of Music (RCM) is one of the world's leading conservatoires, providing specialized musical education and professional training at the highest international level for performers and composers.

Founded in 2000, the Centre for Performance Science (CPS) is an internationally distinctive centre for research and knowledge exchange in music performance science. A central aim of the CPS is to remain alert to the particular mission and purpose of conservatoire training. Its position within a vibrant musical environment and focus on applied research distinguishes it from university-based centres with overlapping interests. The CPS offers teaching and supervised research opportunities at all levels of the RCM's undergraduate and postgraduate programs, including two advanced specialist degrees: the MSc and PhD in performance science.

www.rcm.ac.uk/cps

Campus plan



Note

Registration, lunch, breaks, poster sessions, and keynote addresses are in Seiwakan (No. 9).
Thematic sessions are in Hokko (No. 2).

* Cultural landmarks

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