

Proceedings of
ISPS 2009

Proceedings of the International Symposium on Performance Science 2009

Edited by

AARON WILLIAMON

Royal College of Music, London

SHARMAN PRETTY

The University of Melbourne

and

RALPH BUCK

The University of Auckland



Association Européenne
des Conservatoires,
Académies de Musique
et Musikhochschulen (AEC)



Association Européenne
des Conservatoires,
Académies de Musique
et Musikhochschulen (AEC)

AEC, PO Box 805, NL-3500 AV Utrecht, The Netherlands

Published worldwide in The Netherlands by the
Association Européenne des Conservatoires, Académies de Musique et Musikhochschulen (AEC)

The AEC is a European network of institutions in higher music education
www.aecinfo.org

Copyright © AEC 2009
First published 2009

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior permission in writing of the publisher, or as expressly permitted by law, or under terms agreed with the appropriate reprographics rights organization. Enquiries concerning reproduction outside the scope of the above should be sent to Aaron Williamon, Centre for Performance Science, Royal College of Music, Prince Consort Road, London SW7 2BS, United Kingdom.

Disclaimer. Statements of fact and opinion in the articles in the *Proceedings of ISPS 2009* are those of the respective authors and contributors and not of the editors or the AEC. Neither the AEC nor the editors make any representation, express or implied, in respect of the accuracy of the material in this volume and cannot accept any legal responsibility or liability for any errors or omissions that may be made. The reader should make her or his own evaluation as to the appropriateness or otherwise of any experimental technique described.

ISBN 978-94-90306-01-4

Cover design by Christopher Tomlin
Printed by GEON (www.geongroup.com)
in New Zealand

Preface and acknowledgments

The second International Symposium on Performance Science, ISPS 2009, explored the theme *Performing Excellence* from interdisciplinary perspectives across the arts, as well as the natural, social, and applied sciences. Hosted by the National Institute of Creative Arts and Industries at The University of Auckland, the conference brought together delegates from over 30 countries to debate and to *experience* performing excellence through a wide array of theoretical, practical, and methodological perspectives.

This proceedings volume represents the lively discussion that ensued. Covering such topics as motivation and the development of expertise, the psychology and physicality of performance, performers' health, and the perception, analysis, and evaluation of performance, the 100 articles contained herein offer a glimpse into a growing and vibrant field.

We are grateful to several individuals and organizations whose generous support and contributions have made ISPS 2009 possible. Firstly, we wish to thank the many artists and scientists who have contributed their valuable work to both the conference and to this volume. We are also deeply indebted to The University of Auckland, Royal College of Music, and members of the Scientific and Organizing Committees for providing unwavering support for this event, from the early planning stages onwards. We are delighted to acknowledge the following partners of ISPS 2009: the Asia-Pacific Society for the Cognitive Sciences of Music (APSCOM), British Council, European Association of Conservatoires (AEC), International Association for Dance Medicine and Science (IADMS), International Society for Music Education (ISME), Performing Arts Medicine Association (PAMA), and Society for the Psychology of Aesthetics, Creativity, and the Arts. Finally, we would like to acknowledge the following individuals, who have given unreservedly of their time and ingenuity in putting this event together: Claire Speedy and Steve Burns at The University of Auckland for their tireless work in bringing this event together, and Rosie Burt-Perkins and Terry Clark at the Royal College of Music for invaluable help in editing and revising the proceedings manuscript.

Aaron Williamon
Sharman Pretty
Ralph Buck

Contents

Scientific committee *page ix*

TUESDAY, 15 DECEMBER 2009

Keynote paper

Performance, science, and society *page 5*

Robert Winston

WEDNESDAY, 16 DECEMBER 2009

Keynote paper

Discovering deliberate practice activities that overcome plateaus and limits on improvement of performance *page 11*

K. Anders Ericsson

Symposium

Physical and psychological vulnerabilities in music and dance students *page 23*

Thematic sessions

The vocabulary of performance *page 43*

Performance analysis *page 63*

Symposium

Performance science: Implications for educational and professional practice *page 83*

Thematic sessions

Expression and interpretation I *page 105*

Expertise development *page 125*

Expression and interpretation II *page 145*

Memory and performance *page 165*

Graduate award paper

Fast feedforward error-detection mechanisms in highly skilled performance *page 187*

María Herrojo Ruiz

THURSDAY, 17 DECEMBER 2009

Keynote paper

A balanced approach to excellence: Life skill intervention and elite performance *page 203*
Deidre Anderson

Poster session *page 215*

Symposium

Musician's dystonia: New aspects in pathophysiology and treatment *page 373*

Thematic sessions

Understanding performance *page 401*

The perception of technique *page 421*

Emotion in performance *page 437*

Workshops *page 457*

FRIDAY, 18 DECEMBER 2009

Symposium

Student musicians' motivation, learning, and performance *page 467*

Thematic sessions

Performers' health *page 493*

Performance and life factors *page 513*

Physicality of performance *page 529*

Defining performance *page 545*

Psychology of performance *page 565*

Perceiving performance *page 581*

Keynote paper

The dominant artistic discourse as a health determinant *page 599*
Sylvie Fortin

Author index *page 611*

Scientific committee

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

Sharman Pretty, *co-chair*
The University of Melbourne (Australia)

Ralph Buck, *co-chair*
The University of Auckland (New Zealand)

Mayumi Adachi
Hokkaido University (Japan)

Eckart Altenmüller
Hanover University of Music and Drama (Germany)

Emmanuel Bigand
University of Burgundy (France)

Jane Boston
Royal Academy of Dramatic Arts (UK)

Daniela Coimbra
ESMAE, Porto Polytechnic Institute (Portugal)

Hubert Eiholzer
Conservatory of Italian Switzerland (Switzerland)

Dianna Kenny
The University of Sydney (Australia)

Alison McGregor
Imperial College London (UK)

Caroline Palmer
McGill University (Canada)

Miikka Peltomaa
Finnish Musicians' Medicine Association (Finland)

Emma Redding
Trinity Laban Conservatoire of Music and Dance (UK)

Dale Speedy
The University of Auckland (New Zealand)