58th AES International Conference 2015

Music Induced Hearing Disorders

Aalborg, Denmark 28-30 June 2015

Editors:

Rodrigo Ordonez

Robert Schulein

ISBN: 978-1-5108-0812-6

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright[©] (2015) by the Audio Engineering Society All rights reserved.

Printed by Curran Associates, Inc. (2015)

For permission requests, please contact the Audio Engineering Society at the address below.

Audio Engineering Society 60 East 42nd Street Room 2520 New York, New York 10165-2520

Phone: (212) 661-8528 Fax: (212) 682-0477

hq@aes.org

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400 Fax: 845-758-2634 Email: curran@proceedings.com Web: www.proceedings.com

Table of Contents

PAPER SESSION 1: EFFECTS ON HEARING AND PERCEPTION PRODUCED BY EXPOSURE TO MUSIC

- 1-1 Effects of Sound-Induced Hearing Loss and Hearing Aids on the Perception of Music (Invited)—Brian C.J. Moore, University of Cambridge, UK 1
- 1-2 Use of and Attitudes Towards Hearing Protection in the Sound and Music Industries: Results of a Pilot Survey— Annie Jamieson, University of Leeds, UK 9
- 1-3 Loudness Scaling Tests in Hearing Problems Detection— Bozena Kostek, Piotr Suchomski, Piotr Odya, Gdansk University of Technology, Gdansk, Poland 19
- 1-4 Hearing Measurements During Two Norwegian Music Festivals—*Tron Vedul Tronstad*, SINTEF ICT, Acoustics Group, Trondheim, Norway 25

PAPER SESSION 2: DETECTION OF MUSIC INDUCED HEARING DISORDERS

- 2-1 A Retrospective on Studies on Cochlear Mechanics, Evoked Otoacoustic Emissions, and Prevention of Hearing Loss Due to Overexposure—A New Integrative Model (Invited)—Eric LePage, OAEricle Australia, Claremont, Australia; Facultes de Medecine et de Pharmacie, Equipe Biophysique Neurosensorielle, Clermont-Ferrand, France 34
- 2-2 Music and Musician Earplugs: Temporary Effects of Music Exposure while Wearing Hearing Protectors— Annelies Bockstael, Hannah Keppler, Dick Botteldooren, Ghent University, Belgium 48
- 2-3 ER-10X Extended Bandwidth Research Probe System— Steve Iseberg,¹ Jonathan Siegel,² Dan Mapes-Riordan,¹ Robert Cochran¹ ¹Etymotic Research, Inc., Elk Grove Village, IL, USA ²Northwestern University, Evanston, IL, USA 55
- 2-4 Design of an Acoustic Probe to Measure Otoacoustic Emissions Below 0.5 kHz—Anders Tornvig Christensen, Rodrigo Ordonez, Dorte Hammershøi, Aalborg University, Aalborg, Denmark 61

PAPER SESSION 3: HEARING AID TECHNOLOGY FOR MUSIC AND TREATMENT

- 3-1 New Opportunities for Hearing Impaired Music Lovers (Invited)—*Nikolai Bisgaard*, GN Resound as, Ballerup, Denmark 69
- 3-2 Music Technology for Tinnitus Treatment within TINNET—Jaime Serquera,¹ Winfried Schlee,^{1,2} Rüdiger Pryss,³ Patrick Neff,^{4,5} Berthold Langguth ¹Tinnitus Research Initiative (TRI) ²University of Regensburg, Germany ³Ulm University, Ulm, Germany ⁴University of Zurich, Zurich, Switzerland ⁵University of the Arts (ZHdK), Zurich, Switzerland 76

3-3 Programming Hearing Aids for Musical Purpose—*Esther Rois-Merz*, Audienz – musikalische Hörberatung e.U., Vienna, Austria 81

PAPER SESSION 4: SOUND LEVEL MANAGEMENT AND CONTROL

- 4-1 Amplified Music and Sound Level Management: A Multi Stakeholder Perspective—Johannes Mulder, Murdoch University, Perth, Western Australia 90
- 4-2 Sound Level Measurements and Control at Large Dance Events—Marcel Kok, dBcontrol, Zwaag, The Netherlands 98
- 4-3 Soundlevel Measurements Made EaZy: 10EAZY— Intuitive SPL Monitoring for Live Sound Events—Jacob Navne, Inventor of 10EaZy; SG Audio Aps 103
- 4-4 An Investigation of the Sound Pressure Level at the Roskilde Festival—*Carsten Borg*, Oticon A/S, Smørum, Denmark 109

PAPER SESSION 5: HEARING PROTECTION IN THE MUSIC INDUSTRY

- 5-1 New Developments in In-Ear Monitor (IEM) Technology For Musicians With Hearing Loss (Invited)—Heather Malyuk,¹ Robert Schulein,² Michael Santucci¹
 ¹Sensaphonics Hearing Conservation, Chicago, IL, USA
 ²ImmersAV Technology, Schaumburg, IL, USA 114
- 5-2 Towards a Better Hearing Protection Experience for Musicians: Music Filters and Acoustic Leakage Tester— *Pieter Van 'T Hof*, Dynamic Ear Company, Delft, The Netherlands 120
- 5-3 Directional Characteristics for Different In-Ear Recording Points—Anders Kalsgaard Møller,¹ Flemming Christensen,¹ Pablo Faundez Hoffmann,² Dorte Hammershøi¹
 ¹Aalborg University, Aalborg East, Denmark
 ²Now at Huawei Technologies Duesseldorf GmbH, Munich, Germany 126

PAPER SESSION 6: HEADPHONE SOUND EXPOSURE AND MEASUREMENT STANDARDS

- 6-1 Prevention of Hearing Loss from the Use of Personal Music Players (Invited)—*Thomas Lund*, TC Electronic A/S, Risskov, Denmark 131
- 6-2 Dose Estimate by Personal Music Players Based on Weighted Output Voltage—Dorte Hammershøi, Rodrigo Ordoñez, Anders Tornvig Christensen, Aalborg University, Aalborg, Denmark137
- **6-3** The Acoustical Significance of Age-Dependent Ear Elongation—*Flemming Christensen*, Aalborg University, Aalborg, Denmark 144