A Sound Foundation Through Early Amplification 2001

Proceedings of the Second International Conference

Edited by Richard C. Seewald, Ph.D. and Judith S. Gravel, Ph.D.

A Sound Foundation Through Early Amplification 2001 Proceedings of the Second International Conference

Copyright $\ensuremath{\mathbb{C}}$ 2002 by Phonak AG

All rights reserved

No part of this book may be reproduced in any form except as may be expressly permitted by the publisher. All inquiries should be addressed to Ora Buerkli-Halevy, Phonak AG.

Proceedings of the international conference, A Sound Foundation Through Early Amplification 2001: held November 2001 in Chicago, Illinois (USA), sponsored by Phonak

ISBN: 3-9522009-1-3

This book was produced by Immediate Proceedings Limited (http://www.immediateproceedings.com) and manufactured in Great Britain by St. Edmundsbury Press

Contents

| Preface v Contributors vii Dedication ix Section I. Auditory Development 1 | |
|--|---|
| | |
| 2. | Development of Binaural Audition and Predictions for Real-World Environments Ruth Y. Litovsky |
| 3. | Developmental Psychoacoustics: Science to Practice Robert J. Nozza |
| Section | on II. Assessment Strategies for Hearing Instrument Fitting |
| 4. | Some Factors that May Influence the Accuracy of Auditory Brainstem Response Estimates of Hearing Loss <i>Michael P. Gorga and Stephen T. Neely</i> |
| 5. | Possible Roles for the Auditory Steady-State Responses in Fitting Hearing Aids Terence W. Picton, Andrew Dimitrijevic, Patricia van Roon, M. Sasha John, Marilyn Reed and Heather Finkelstein |
| 6. | Growth of Loudness Assessment in Children using Cross-Modality Matching (CMM) Yula C. Serpanos and Judith S. Gravel |
| 7. | Potential Pitfalls in the Audiological Assessment of Infants and Young Children Judith S. Gravel |
| Section | on III. Pediatric Hearing Instrument Fitting103 |
| 8. | An Amplification Protocol for Infants Kathryn Laudin Beauchaine |
| 9. | Signal Processing for Severe-to-Profound Hearing Loss Stefan Launer and Volker Kühnel |
| 10. | Electroacoustic Verification Measures with Modern Hearing Instrument Technology Susan D. Scollie and Richard C. Seewald |
| Section | on IV. Current Issues in High-Frequency Amplification for Infants and Children . 139 |
| 11. | Do Children Require More High-Frequency Audibility than Adults with Similar Hearing Losses? <i>Teresa Y.C. Ching, Harvey Dillon and Richard Katsch</i> |
| 12. 13. | Dead Regions in the Cochlea: Implications for the Choice of High-Frequency Amplification Brian C.J. Moore. The Importance of High-Frequency Amplification for Young Children |
| 10. | Patricia G. Stelmachowicz |

| Section V. Special Populations | | |
|--------------------------------|---|--|
| 14. | Children with Mild and Unilateral Hearing Impairment Adrian Davis, Kirsti Reeve, Sally Hind and John Bamford | |
| 15. | Changing Considerations for Cochlear Implant Candidacy: Age, Hearing Level and Auditory Neuropathy | |
| 16. | Yvonne S. Sininger 187 Should Children Who Wear a Cochlear Implant in One Ear Use a Hearing Aid in the Opposite Ear? 187 Teresa Y.C. Ching, Colleen Psarros, Mandy Hill and Jane Smither 195 | |
| 17. | Optimization of Amplification for Deaf-Blind Children Anne Marie Tharpe, Daniel H. Ashmead, Todd A. Ricketts, Ann M. Rothpletz and Robert Wall 203 | |
| Sectio | on VI. Management and Service Delivery Considerations | |
| 18. | Provision and Fitting of New Technology Hearing Aids: Implications from a Survey of Some 'Good Practice Services' in UK and USA | |
| 19. | John Bamford, Dee Beresford, George Mencher, Shirley DeVoe, Victoria Owen and Adrian Davis 213 The Social-Emotional Ramifications of Universal Newborn Hearing Screening, Early Identification and Intervention of Children who are Deaf or Hard of Hearing | |
| 20. | Christine Yoshinaga-Itano | |
| | and Pediatric Audiologists. Melody Harrison and Jackson Roush | |
| 21. | Conference Endnote Address Looking for the Hearing-Impaired Child: Past, Present and Future | |
| | Agnete Parving | |
| Autho | r Index | |

PREFACE

In 1947, Sir Alexander and Lady Irene Ewing, in their book *Opportunity and the Deaf Child*, described their landmark approach to auditory training and communication development in young children with hearing loss, a philosophy we now term "early intervention". In post-war England, despite "abundant evidence of the great benefit derived from the regular use of hearing aids" (p. 91), there were practical (physical weight 1.5 pounds) and electro-acoustic limitations of personal amplification devices that limited their use in young children. These great advocates for use of residual hearing advised, "hearing aids be only used by under-fives [years] intermittently and for frequent short periods" (p. 94)" and further concluded, "with three to fives, home use of an aid should only be undertaken under the closest expert supervision" (p. 93). Clearly in 1947, the term 'early amplification' had a different connotation than it does today.

Half a century later, these great pioneers of our field would, no doubt, be amazed by the advances in hearing instrument technology. Moreover, we can only imagine how heartened they would be by the newborn hearing screening initiatives underway worldwide, with the ultimate goal of providing early intervention to infants with congenital hearing loss within the first six months of life. Despite these advances, pediatric audiologists have come to realize rapidly that the fitting of current amplification technology to infants and young children with hearing loss remains a most challenging clinical problem.

To assist clinicians in responding to these challenges, the Second International Conference was designed to overview current research and new developments that are relevant to the provision of a sound foundation through early amplification to infants and young children with hearing loss. Almost immediately following the highly successful (first) International Conference *A Sound Foundation Through Early Amplification* in October of 1998, planning was initiated for a second meeting three years later. Many (us very much included) thought that no conference or proceedings publication could possibly surpass the quality of the first. Yet on November 8–10, 2001 in Chicago, the Second International Conference proved the doubters wrong. Twenty-three faculty and over 450 attendees, who traveled from more than 20 different nations, came together for a stimulating and enriching educational event. In our opinion, the chapters contained within this volume of the Proceedings of the Second International Conference: A Sound Foundation Through Early Amplification 2001 reflect the highquality, breadth, depth and the excitement of the meeting.

Numerous individuals contributed their time and talent to make the second international conference so highly successful. We thank our colleagues, John Bamford and Patricia Stelmachowicz who served as the other two members of the Conference Steering Committee. An outstanding faculty willingly shared new knowledge and insights. We are indebted to these individuals, all who gave superb presentations and subsequently conveyed that information through the excellent chapters they wrote for this volume.

We thank Cathy Jones, Dee Lower, and Liz Brassine and numerous others at Phonak US who deftly orchestrated the conference. Their meticulous planning of local arrangements, audio-visual support, poster session, social events and the post-conference workshops, as well as their attention to the comfort and well being of the conferees and speakers is gratefully acknowledged. Thanks to Mike Jones, President of Phonak US who continues his generous support and enthusiastic commitment to the concept of international conferences that deal exclusively with the amplification needs of infants and children with hearing loss.

From her office at Phonak AG in Stäfa, Switzerland, Claudia Bachler provided invaluable help with preparations on both sides of the Atlantic. As was true of the first conference, Ora Buerkli at Phonak AG continues to be its strongest advocate and most fervent supporter. Ora's foresight and sensitivity transformed a concept into a reality for yet a second time. We are appreciative of the support of Bob Banbury, Managing Director of Immediate Proceedings Limited, Suffolk, UK who ushered along the publication of these Proceedings in such a timely manner. Finally, we are deeply grateful to Carol Van Evera whose competent and indefatigable reviewing and style editing of the submitted manuscripts made the process of publishing these proceedings even feasible.

The initial planning for the Third International Conference (Chicago, November of 2004) has begun. While awaiting that event, we hope you will read and reflect upon the wealth of information contained in these Proceedings. Our goals for this volume will have been achieved if the information contained herein is of benefit in your daily work with infants and children with hearing loss, and fosters further research in our complex and richly rewarding field.

Richard C. Seewald, Ph.D. London, Canada

Judith S. Gravel, Ph.D. New York, USA

Reference:

Ewing, A.W.G., and Ewing, I.R. 1947. *Opportunity and the deaf child*. London, England: University of London Press Ltd.

CONTRIBUTORS

Daniel H. Ashmead, Ph.D. Vanderbilt Bill Wilkerson Center for Otolaryngology and Communication Sciences 1114 19th Avenue South Nashville, Tennessee, USA 37212

John M. Bamford, Ph.D. Centre for Human Communication and Deafness University of Manchester Manchester M13 9PL, UK

Kathryn Laudin Beauchaine, M.A. Department of Audiology Boys Town National Research Hospital 555 North 30th Street Omaha, Nebraska, USA 68131

Dee Beresford, M.Sc. MRC Institute of Hearing Research University Park Nottingham NG7 2RD, UK

Teresa Y.C. Ching, Ph.D. National Acoustic Laboratories 126 Greville Street Chatswood, New South Wales, Australia 2067

Adrian Davis, Ph.D. MRC Institute of Hearing Research University Park Nottingham NG7 2RD, UK

Shirley DeVoe, M.Sc. MRC Institute of Hearing Research University Park Nottingham NG7 2RD, UK

Harvey Dillon, Ph.D. National Acoustic Laboratories 126 Greville Street Chatswood, New South Wales, Australia 2067

Andrew Dimitrijevic, M.Sc. Rotman Research Institute Baycrest Centre for Geriatric Care 3560 Bathurst Street Toronto, Ontario, Canada M6A 2E1

Heather Finkelstein, M.Sc.(A) Department of Communication Disorders Baycrest Centre for Geriatric Care 3560 Bathurst Street Toronto, Ontario, Canada M6A 2E1

Michael P. Gorga, Ph.D. Boys Town National Research Hospital 555 North 30th Street Omaha, Nebraska, USA 68131 Judith S. Gravel, Ph.D. Rose F. Kennedy Center – Room 843 Albert Einstein College of Medicine 1300 Morris Park Avenue Bronx, New York, USA 10461

Melody Harrison, Ph.D. Division of Speech and Hearing Sciences, CB 7190 University of North Carolina School of Medicine Chapel Hill, North Carolina, USA 27599

Robert V. Harrison, Ph.D. Department of Otolaryngology The Hospital for Sick Children 555 University Avenue Toronto, Ontario, Canada M5G 1X8

Mandy Hill, BA (Hons), Dip.Aud. National Acoustic Laboratories 126 Greville Street Chatswood, New South Wales, Australia 2067

Sally Hind, Ph.D. MRC Institute of Hearing Research University Park Nottingham NG7 2RD, UK

M. Sasha John, Ph.D. Rotman Research Institute Baycrest Centre for Geriatric Care 3560 Bathurst Street Toronto, Ontario, Canada M6A 2E1

Richard Katsch, B.Sc. National Acoustic Laboratories 126 Greville Street Chatswood, New South Wales, Australia 2067

Volker Kühnel, Ph.D. Department of Signal Processing Research and Development Phonak AG Laubisruetistr. 28 8712 Stäfa, Switzerland

Stefan Launer, Ph.D. Department of Signal Processing Research and Development Phonak AG Laubisruetistr. 28 8712 Stäfa, Switzerland

Ruth Y. Litovsky, Ph.D. University of Wisconsin-Madison Waisman Center, Room 567 1500 Highland Avenue Madison, Wisconsin, USA 53706

George T. Mencher, Ph.D. MRC Institute of Hearing Research University Park Nottingham NG7 2RD, UK Brian C.J. Moore, Ph.D. Department of Experimental Psychology University of Cambridge Downing Street Cambridge CB2 3EB, UK

Stephen T. Neely, D.Sc. Boys Town National Research Hospital 555 North 30th Street Omaha, Nebraska, USA 68131

Robert J. Nozza, Ph.D. Section of Audiology Department of Otolaryngology Temple University School of Medicine Broad and Tioga Streets – 3rd Floor Kresge West Philadelphia, Pennsylvania, USA 19140

Victoria Owen, M.Sc. MRC Institute of Hearing Research University Park Nottingham NG7 2RD, UK

Agnete Parving, M.D. Department of Audiology Bispebjerg Hospital H:S DK 2400 Copenhagen NV, Denmark

Terence W. Picton, M.D., Ph.D. Rotman Research Institute Baycrest Centre for Geriatric Care 3560 Bathurst Street Toronto, Ontario, Canada M6A 2E1

Colleen Psarros, M. App. Sc. (Aud) Sydney Cochlear Implant Centre P.O. Box 188 Gladesville, New South Wales, Australia 1675

Marilyn Reed, M.Sc. Department of Communication Disorders Baycrest Centre for Geriatric Care 3560 Bathurst Street Toronto, Ontario, Canada M6A 2E1

Kirsti Reeve, M.Sc. MRC Institute of Hearing Research University Park Nottingham NG7 2RD, UK

Todd A. Ricketts, Ph.D. Vanderbilt Bill Wilkerson Center for Otolaryngology and Communication Sciences 1114 19th Avenue South Nashville, Tennessee, USA 37212

Ann M. Rothpletz, M.S.
Vanderbilt Bill Wilkerson Center for Otolaryngology and Communication Sciences
1114 19th Avenue South Nashville, Tennessee, USA 37212 **Jackson Roush, Ph.D.** Division of Speech and Hearing Sciences, CB 7190 University of North Carolina School of Medicine Chapel Hill, North Carolina, USA 27599

Susan D. Scollie, M.Cl.Sc. National Centre for Audiology University of Western Ontario London, Ontario, Canada N6G 1H1

Richard C. Seewald, Ph.D. National Centre for Audiology

University of Western Ontario London, Ontario, Canada N6G 1H1

Yula C. Serpanos, Ph.D. Department of Communication Sciences and Disorders Adelphi University Hy Weinberg Center Cambridge Avenue Garden City, New York, USA 11530

Yvonne S. Sininger, Ph.D. Department of Surgery School of Medicine University of California Los Angeles Los Angeles, California, USA 90095-1624

Jane Smither, M.Clin.Aud. Sydney Cochlear Implant Centre P.O. Box 188 Gladesville, New South Wales, Australia 1675

Patricia G. Stelmachowicz, Ph.D. Boys Town National Research Hospital 555 North 30th Street Omaha, Nebraska, USA 68131

Anne Marie Tharpe, Ph.D. Vanderbilt Bill Wilkerson Center for Otolaryngology and Communication Sciences 1114 19th Avenue South Nashville, Tennessee, USA 37212

Patricia van Roon, B.Sc. Rotman Research Institute Baycrest Centre for Geriatric Care 3560 Bathurst Street Toronto, Ontario, Canada M6A 2E1

Robert Wall, Ph.D. Vanderbilt Bill Wilkerson Center for Otolaryngology and Communication Sciences 1114 19th Avenue South Nashville, Tennessee, USA 37212

Christine Yoshinaga-Itano, Ph.D. Department of Speech, Language and Hearing Sciences University of Colorado-Boulder Campus Box 409 Boulder, Colorado, USA 80309–0409

DEDICATION

"Teaching is reminding others that they know just as well as you" Bach, 1977

These Conference Proceedings are dedicated to our teachers -

Mark Ross and Fred H. Bess

They encouraged and supported us, gave willingly of their wisdom and imparted their passion for this field. Their mentoring continues to affect every aspect of our professional lives and we will always be grateful.

Richard Seewald and Judith S. Gravel

This article was previously published in the Proceedings of the Second International Conference "A Sound Foundation Through Early Amplification" Sponsored by Phonak edited by Richard Seewald, Ph.D. and Judith Gravel, Ph.D. This article is reprinted here with permission from the author(s) and Phonak for educational purposes.

The Proceedings of the Second International Conference "A Sound Foundation Through Early Amplification" was originally produced by Immediate Proceedings, Ltd.

Please join us for the next conference, "ACCESS Acheiving Clear Communications Employing Sound Solutions" to be held in Chicago, IL November 11-13, 2003.



For information about "ACCESS: Achieving Clear Communication Employing Sound Solutions" please visit please visit www.phonak.com.