

37th Conference of the International Society of Biomechanics in Sports



ISBS2019

Conference Proceedings

July 21-25, 2019

Miami University, Oxford, OH USA



MIAMI UNIVERSITY

COLLEGE OF EDUCATION, HEALTH & SOCIETY

Department of Kinesiology and Health

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Editors:

Sarah Breen (Northern Michigan University)

Mark Walsh (Miami University)

Meredith Stutz (Miami University)

Each paper in these proceedings has been reviewed by at least two members of the scientific committee. The scientific committee comprises the current members of the board of directors of the ISBS and the keynote speakers for the upcoming conference.

The correct format for citations as per APA style guidelines for the Sports Biomechanics journal (http://www.tandf.co.uk/journals/authors/style/reference/tf_APA.pdf) is as follows:

Author, A. A. (Year). Title of article. Title of the Journal, Volume(Issue), pp-pp.
Retrieved from WEBSITE

A sample citation using the 2014 Dyson lecture would be as follows:

Harrison, A. J. (2014, July). Applications of Functional Data Analysis in Sport Biomechanics. In K. Sato, W. A. Sands, & S. Mizuguchi (Eds.), *Proceedings of the 32nd International Conference of Biomechanics in Sports*. (pp. 1-9). Konstanz, Germany: International Society of Biomechanics in Sports. Retrieved from <https://ojs.ub.uni-konstanz.de/cpa/article/view/5905/5390>



The International Society of Biomechanics

Primary Purposes

- To provide a forum for the exchange of ideas for sports biomechanics researchers, coaches, and teachers.
- To bridge the gap between researchers and practitioners.
- To gather and disseminate information and materials on biomechanics in sports.

Members

The International Society of Biomechanics in Sports is composed of members from all over the world with a common desire to study and understand human movement, especially as it relates to applied sports biomechanics. Participants come from a wide range of backgrounds including exercise science, education, engineering, computer science, rehabilitation and medicine to name a few. ISBS members have written some of the most widely used university textbooks as well as practitioner books and manuals. Hundreds of refereed journal articles, as well as widely read practical articles in popular journals, have been published by ISBS members. In addition, members have developed new coaching, teaching and training strategies and patented sports, exercise and rehabilitation equipment. The majority of pioneers from the computer era of sports biomechanics have at one time or another participated in ISBS activities, with most innovations in biomechanics research technology having come from these individuals. In short, if it is sports biomechanics, ISBS members are in it.

Annual Conference

The first full scale conference of the International Society of Biomechanics in Sports (ISBS) was held June 20-25, 1982, in San Diego, California, with 123 participants. ISBS initiated a constitution on May 7, 1983, with subsequent constitutional revisions over time to suit the changing needs of the Society. Some of the first field-based research activities of ISBS were at the 1976 Olympic Games and 1978 Commonwealth Games, with numerous other research projects completed since that time. The Annual Conference of the ISBS family are conducted in a friendly atmosphere, which favors and encourages wide participation. This ISBS congeniality is unique and dear to its members. The quality of research presented and materials produced are at the cutting edge of knowledge and technology. In addition to oral and poster research presentations select sport science topics are covered in depth each year through special lectures. In addition, a special feature includes the Geoffrey H.G. Dyson lecture presented by an outstanding scientist in sports biomechanics. A number of other awards and recognitions are given each year including the new Investigator Award.

Acknowledgements

We would like to thank everyone who helped make this year's conference possible including but not limited to the Department of Kinesiology and Health at Miami University, all of our sponsors and exhibitors, Sarah Breen for her help with the conference proceedings, current ISBS President Young-Hoo Kwon and everyone else from ISBS who supported our efforts. We would also like to thank the abstract reviewers for the hours of reviewing they provided, as well as the session chairs in advance for helping the conference sessions to run smoothly. And finally, a special thanks to the ISBS 2019 organizing committee: William Berg, Eric Slattery, Dean Smith and Meredith Stutz for a year of hard work.

Thank you all for putting this together.

Conference Organizing Committee

Conference Chair: Mark Walsh (Miami University)

William Berg (Miami University)

Dean Smith (Miami University)

Eric Slattery (Miami University)

Meredith Stutz (Miami University)

ISBS Executive Committee

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Steffen Willwacher (German Sport University)

Johannes Funken (German Sport University)

Pedro Morouço (Instituto Politécnico de Leiria)

Marcus Lee (Singapore Sports Institute)

Scientific Program

A total of 126 papers were accepted into this year's International Society of Biomechanics in Sport Conference, these papers have been selected to be presented in either an oral or a poster session format. In addition to these papers, keynote lectures and applied sessions with research from emerging and established academics in the sport biomechanics field are included to enhance the scientific program. This year's conference papers covered the following topics:

- Injury Prevention
- Growth and Aging
- Rehabilitation
- Education
- Implement Sports
- Motor Control
- Stronger
- Methods
- Computing-Modeling
- Technology/Equipment
- Olympic
- Triathlon
- Boat Sports
- Combat
- Rugby Codes
- Gym Codes
- Wearable Technology