Dear ISBS Colleagues,

Congratulations to the ISBS organizers, speakers, and delegates who participated in the virtual Mid Year Symposium February 4th and 5th. This virtual meeting was a great success with numerous presentations across nine major sessions and 230 people participating from throughout the world. Thank you also to ISBS Sponsor Vicon and symposium sponsor SiMi. Special thanks go to several members of the ISBS Board who organized the Mid Year Symposium. The success of this virtual symposium in sharing sports biomechanics knowledge will come in handy as the ISBS 2021 conference organizers and the ISBS executive council have made the difficult decision to move our annual conference in September to an online format given the travel restrictions due to COVID-19.

While we are all disappointed not to be able to travel to Australia in person to see what the University of Canberra and the Australian Institute of Sport had planned, sports biomechanics research and knowledge continue to advance and we look forward to the virtual 2021 ISBS Conference (http://isbs2021.org). The conference organizers Wayne, Nick, Celeste, John, Cody, and the ISBS Board will continue to work hard to review submitted papers, select an outstanding program of cutting-edge sports biomechanics research, and publish the reviewed papers in our proceedings. The ISBS 2021 virtual conference will not only continue our traditions of outstanding science and warm ISBS hospitality, but will also be easy and inexpensive to attend and participate. Check the conference and society website for information about awards, registration, and paper submission. The newsletter, isbs.org, and our social media (@ISBSOFFICIAL and https://www.facebook.com/isbsofficial/) will provide all you need to know about ISBS initiatives and events.

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Message from the President

Duane Knudson

I closed my last column reminding everyone to step-up for ISBS by inviting others to become ISBS members and attend our conference, sharing your passion for the society, encouraging members to remain engaged, and contributing to ISBS initiatives and our journal (Sports Biomechanics). ISBS is working on many initiatives including student representation, caregiver membership, a code of conduct, and position statements on validation of wearable sensors. If you are willing to join the ISBS leadership, please consider nominating yourself for a position on the board in the future. Many of you may also be eligible for ISBS awards and grants so be sure to learn about those opportunities on our website. ISBS values your support of the society and the support of our major society sponsor Vicon (Vicon | Award Winning Motion Capture Systems). You are ISBS and we need all our members to participate in the society, its meetings, and promotion of our applied mission. We are enriched by the diversity of scholars, cultures, and sporting traditions of ISBS members.

Let me close by thanking you for that past support of ISBS. My very best wishes for personal safety, good health, and success in your research and teaching. I hope to see you online at the 2021 ISBS conference hosted by the University of Canberra and the Australian Institute of Sport September 3rd to the 7th. “See” you at the conference and the Annual General Meeting.

Duane Knudson

President, ISBS
The time for the 2021 ISBS elections is here! Following are the statements and photos of the candidates for the Board of Directors. A link to the ballot will be sent via email to all members with paid dues. Members may vote for up to 10 candidates from professional members and one candidate from student members.

**Arnel Aguinaldo**

Arnel Aguinaldo is an Associate Professor in Biomechanics and Kinesiology at Point Loma Nazarene University (PLNU). As a board-certified athletic trainer (ATC) with a BS in Bioengineering and PhD in Health and Human Performance, Dr. Aguinaldo brings a unique combination of engineering and clinical perspectives to current research endeavors, which focus primarily on baseball pitching mechanics, injury pathomechanics, and gait analysis. He previously served as the Director of the Motion Analysis Laboratory at Rady Childrens Hospital San Diego. As a longstanding member of ISBS, he and his students have presented research since his first talk at Caceres Spain in 2002.

**Jordan Andersen**

Jordan’s research started at the University of Waterloo and he now manages the Biomechanics Lab at the University of Sydney. He was awarded the ISBS Student Research Grant in 2018 that funded work at the University of Porto on torso muscle demands in swimming. As an Exercise Physiologist and coach, Jordan brings research to practice helping track and field athletes and swimmers towards the Tokyo Olympics. He is currently using technology to help coaches and athletes and presented at the 2021 Mid-Year Symposium on Neural Networks. Jordan aims to help formulate a clear ISBS Mission Statement into this decade.

**Floren Colloud**

Floren is an Associate Professor in Sport Biomechanics at the University of Poitiers. Floren’s research interests focused on developing subject-specific 3D biomechanics models to analyse and simulate sports movement with a particular interest for cyclic sports. These research activities are strongly embedded in multidisciplinary collaborations with engineering, clinical and sport partners. Floren has been an ISBS member since 2002, the chairperson of the 33rd ISBS conference and has acted as the Vice-President of Public Relations since 2020. Re-election would allow Floren to continue contributing to the development of ISBS, promoting the transfer of knowledge between researchers and practitioners in sport.

**Steffi Colyer**

Steffi is a Lecturer in Biomechanics at the University of Bath in the UK, with specific research interests in sprinting and the application of markerless technologies. She has been a member of ISBS since 2014 and has contributed to six ISBS symposia. Steffi has served on the Board of Directors since 2019. In this time, she has been a committed member of the Grants and Womxn in Sports Biomechanics sub-committees, contributing to the development of new initiatives including the Womxn’s network ‘circles’ and introduction of the caregivers membership. Steffi seeks re-election to further develop these important areas of the society.

**Tim Exell**

I have attended ISBS symposia since 2007, serving as a director and as VP of Research and Projects 2015-2019 and as VP Conferences 2019-. I am an editorial board member for Sports Biomechanics. In these roles, I have been committed to supporting all ISBS members through the student mentor programme, introducing grants to support our members’ research and supporting conference hosts, who have recently faced unprecedented challenges related to the global pandemic. I seek re-election, to continue serving ISBS members and the society and to work with upcoming hosts to ensure a successful return to in-person meetings when possible.
ISBS Board of Directors Election: Professional Members

Randall Jensen
ISBS President Elect

Pablo Floria

I am Lecturer in Sports Biomechanics at the Universidad Pablo de Olavide in Seville. I completed my PhD in Sports Sciences (2006) at Universidad Autónoma de Madrid. My research areas focus on movement and coordination variability. I have been a member of the ISBS since 2016 contributing to its progress and development by presenting several papers to ISBS conferences and as regular reviewer for Sports Biomechanics. I am keen to increase my service to Society as a member of the board of directors collaborating in the dissemination of ISBS especially in Spanish-speaking countries.

Johannes Funken

I started going to ISBS conferences when I was still a master’s student. With being part of the organizing committee of the 2017 conference in Cologne and becoming the ISBS student representative (2018-2020), I was lucky to get a good glance behind the curtain. During my term as student representative, I put effort into giving students a louder voice within ISBS and the board of directors - I am happy to be seeing this effort paying off recently. I am not afraid of constructive discussions while keeping the best for ISBS and its members in mind.

Drew Harrison

Drew Harrison is an Associate Professor in sports biomechanics at the University of Limerick in Ireland. His major research interests are in biomechanics of sprinting and jumping activities and the applications of functional data analysis in biomechanics. Drew is a Life member and Past-President of the ISBS and was co-chair of the ISBS Conference in Limerick in 2009. “It has been an honour to serve on the ISBS Board of directors in the last two years. I would be delighted to serve again and contribute to ISBS in any way I can for the benefit of the society”.

Daniel Herman

Dr. Daniel Herman is an Assistant Professor of Orthopaedics and Rehabilitation at the University of Florida, and holds both a PhD in Biomedical Engineering and a MD with specializations in Physiatry and Sports Medicine. He has served ISBS since 2007 in multiple capacities, and is currently an Associate Editor for Sports Biomechanics. As a member of the ISBS Board of Directors, Dan aims to utilize his perspective and contacts as both a sports clinician and biomechanist to increase membership and participation in ISBS, particularly among clinicians, as well as building upon the society’s strengths in programming at the annual meeting.

Hiro Hobara

Dr. Hiro Hobara is a Senior Researcher in the Artificial Intelligence Research Center at National Institute of Advanced Industrial Science and Technology (AIST) in Tokyo, Japan. His research interests focus on the neuromechanical mechanisms underlying the spring-like leg behavior in humans, and rehabilitation biomechanics in lower limb amputees. Dr. Hobara currently serves as Associate Editor of the Sports Biomechanics (2021-) after six years of experience as the editorial board member (2015-2020). If appointed to the board, he will be actively promoting high-quality scientific research to stimulate intellectual curiosity for all ISBS members.
## ISBS Board of Directors Election: Professional Members

<table>
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<tr>
<th>Candidate</th>
<th>Biography</th>
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<tr>
<td>Shariman Ismadi</td>
<td>My name is Shariman Ismadi bin Ismail. I come from Malaysia. Since 2013, I am working as a lecturer of sports biomechanics at Faculty of Sports Science and Recreation, Universiti Teknologi MARA, Malaysia (PhD in Sports and Health Science). In much early days, I have completed my bachelor and master’s degree in Mechanical Engineering at Gunma University, Japan and Newcastle University, United Kingdom respectively. Coming from South East Asia, I believe I can strongly represent my region in our society and hope that more members from different region of the world can be elected as the face of our society.</td>
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<td>Stuart McErlain-Naylor</td>
<td>Stuart is an enthusiastic academic with a passion for engaging the wider audience in all things sports biomechanics. He serves on the ISBS Publications Committee and is Social Media Editor for the society’s journal Sports Biomechanics. As well as organising the online ISBS Sports Biomechanics Lecture Series, Stuart served on the organising committees of the 2020 online conference and 2021 mid-year symposium. He has previous board experience with the ISB Technical Group on Computer Simulation and his university senate. If elected, Stuart will engage constructively with members and strive to maximise the reach and impact of new and existing initiatives.</td>
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<td>Gretchen Oliver</td>
<td>Gretchen Oliver is a Professor and Director of the Sports Medicine &amp; Movement Laboratory at Auburn University. She received her Ph.D. from Texas Woman’s University in Kinesiology and Biomechanics and has been an active member of ISBS. She has presented 20 times at ISBS conferences and has published over 130 peer-reviewed manuscripts regarding sports biomechanics. Her research focus is on injury prevention and performance enhancement in youth baseball and softball athletes. As a member of the Board of Directors she will be committed advancing the vision of ISBS in the implementation of sports biomechanics research in the clinical/field setting.</td>
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<tr>
<td>Mitsuo Otsuka</td>
<td>Mitsuo Otsuka is an Associate Professor in the Faculty of Sport Science at Nippon Sport Science University, Japan. His research ranges from elite sports to exercise in physical education. He clinched the ISBS Hans Gros New Investigator Award in 2012. He is currently serving on the Board of Directors from 2019 and is very keen to continue serving the society. He reviews papers for Sports Biomechanics regularly. He is passionate about enhancing coaching practices through research and growing Sports Science internationally.</td>
</tr>
<tr>
<td>Hiroki Ozaki</td>
<td>Dr. Hiroki Ozaki gained his PhD at Nihon University. He used to work for the Singapore Sports Institute for three years. He is currently a researcher in Sports Biomechanics at the Japan Institute of Sports Sciences (JISS) in Tokyo. He had vast experiences of science support in the high performance sports. His research interest is to clarify the mechanisms of whipping motion in various sports and assess the efficiency of those skills by using multi-segment power analysis. He hopes to apply his experience in high performance sports research and support in his current position to the development of ISBS.</td>
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ISBS Board of Directors Election: Professional Members

Shinji Sakurai
Shinji Sakurai is a professor of sport biomechanics and was a head of Research Institute of Health and Sports Sciences at Chukyo University in Japan. He obtained his Ph.D. in biomechanics at the University of Tokyo. He has been working as a vice president of Japan Society of Physical Education, Health and Sport Sciences. He was a chief director and will be a President of Japanese Society of Biomechanics in 2021-2023. He is a scientific committee member of Japan Paralympic Committee. He has participated in many ISBS Conferences, gave a keynote lecture in Beijing, and an applied session at Taipei.

Nahoko Sato
Nahoko Sato is an Associate Professor in the Department of Physical Therapy at Nagoya Gakuin University in Japan, and become a new Board of Japanese Society of Biomechanics. Her research interests are to develop the evidence-based evaluation system of hip-hop dancing and injury prevention strategy in dance. She is known as a pioneer of biomechanics for hip-hop dancing and received the Hans Gros New Investigator Award in 2012. "Break dancing" is going to be an Olympic Sport in 2024. She has a keen interest to integrate her biomechanical knowledge into the development, safety and education in dance as a sport.

Kelly Sheerin
I am a Senior Lecturer at the Auckland University of Technology, while also managing the AUT Millennium Sports Performance Clinics. I was on the organising committee for the successful 2018 Conference in Auckland, coordinating the Industry Partnership engagement, and have been a board member since 2019. The global pandemic has changed how we work as biomechanics practitioners, educators and researchers, and the collegiality that ISBS provides is even more important now, as we navigate a new world. If re-elected I will help the Society to ensure it is best positioned to support its members through the next few years.

Elaine Tor
I am the Lead Biomechanist at the Victorian Institute of Sport in Melbourne, Australia. Prior to this, I completed an industry-based PhD at the Australian Institute of Sport in swimming biomechanics. I am very passionate about bridging the gap between biomechanics research and sports performance. Over the past 10 years I have conducted numerous applied research projects that have resulted in positive performance outcomes and Olympic medals. I have been an ISBS member since 2015. If elected I hope to promote international collaboration and information sharing, while assisting the society to continue to grow sports biomechanics as a discipline worldwide.

Jeroen van der Eb
I would like to nominate for the board of directors of the ISBS. Over the past years I have continuously enjoyed attending the ISBS conferences very much and I think it is only appropriate to do something in return for the society. I have quite some administrative experience in (sports) federations (e.g. setting up Instructor Winter Alpine training) and organization of large tournaments. My field of research is mostly dedicated to elite sports (Speed skating, Gymnastics), although I do try to tackle some more fundamental questions about how movements work. I look forward to making a useful contribution to ISBS.
ISBS Board of Directors Election: Student Members

Following are the statements and photos of the candidates for the Board of Directors (student members). A link to the ballot will be sent via email to all members with paid dues. Members may vote for one candidate from student members.

**Evan Crotty**

I am a PhD researcher at the University of Limerick (Ireland). My research focuses on sprinting performance and plantarflexor function. Alongside my research, I provide biomechanical support to elite athletes across multiple sports (rugby, hockey, and track and field) which provides the opportunity to translate some of my research into practice. I am a member of the ISBS student sub-committee and have enjoyed contributing to the student events. I would be honored to serve as a second ISBS Student Officer to continue to support and promote student initiatives, and encourage student interaction in what are challenging times for all researchers.

**Vijay Dhamodharan**

Vijay here. I am an MPhil Sports Biomechanics and Kinesiology student from Tamilnadu Physical Education and Sports University, Chennai, India. I also manage the International Society of Biomechanics (ISB) Linkedin group and ISB 2021 Twitter page. I have been an ISBS member since 2019. I'm also the student representative for the Sports biomechanics and kinesiology department in my university. My master's thesis was on the muscle-tendon profile of long jump athletes. My research interest includes mechanics of muscle-tendon profile, sports biomechanics and aerodynamics, computational biomechanics, biomechanical imaging, and neuroprosthetics in para-athlete.
ISBS Awards 2021

Neil Bezodis, ISBS Vice-President (Awards)
Swansea University, UK

Geoffrey Dyson Award

We look forward to hosting Professor Julie Steele’s 2021 Geoffrey Dyson Award Lecture as part of the online conference. The Dyson Lecture is always a highlight of the conference and we are sure that this year will be no different, particularly as Professor Steele’s lecture will focus on the lessons she has learned throughout her distinguished career in sports biomechanics research. This is certainly not one to be missed no matter what stage of your sports biomechanics career you are at!

Honorary Professor Julie Steele AM
University of Wollongong, Australia

New Investigator Award

We are pleased to announce that the New Investigator Award will be running again this year after it was cancelled in 2020. Eligible applicants will be able to choose to enter the New Investigator Award at the time of submitting their paper to the 2021 conference, but please note that NIA submission deadline will not be extended beyond 16th April because of the longer time it takes to review and judge these papers. Please check the ISBS website (www.isbs.org/awards) for the eligibility criteria and remember that if you submitted a paper to be considered for the New Investigator Award in 2020 but are now outside of the stated eligibility criteria, you are still able to submit and be considered for the award this year due to the cancellation of the award in 2020. The oral award will run in its usual way with the top eight candidates being shortlisted by the judges to present their papers in specific sessions at the 2021 conference in September. We are also very pleased to confirm that the poster award will run this year—further details of the exact format of this will be confirmed in due course but it is likely that it will comprise short (2 -3 minute) pre-recorded presentations.
ISBS Awards 2021 (cont.)

Neil Bezodis

Hans Gros Emerging Researcher Award

We had four strong applications for this year’s Hans Gros Emerging Researcher Award which were judged by members of our hard-working Awards Committee. Several members of the Committee commented on the high quality of all applications, and I am delighted to announce that the 2021 Hans Gros Emerging Researcher Award recipient will be Dr Gregory Tierney from The University of Leeds, UK. Dr Tierney will deliver an award lecture at the 2021 conference entitled Concussion biomechanics and head acceleration exposure in sport: Can we develop player protection strategies without compromising the dynamics of the game?

Call for Future Award Nominations

Whilst the Geoffrey Dyson Award for this year is known, now is the time for me to invite you to propose candidates for the Geoffrey Dyson Award Lecturer in 2022. It is also the time for you to propose candidates for Life Members of ISBS and Fellows of ISBS. These are all extremely prestigious ISBS awards and I would ask you to think carefully about any colleagues who you feel may be deserving of these awards. The criteria required for nomination or application for each of these awards are available at www.isbs.org/awards. Any nominations must be forwarded to me (vpawards@isbs.org) by 30th April, 2021. Only nominations forwarded by this date will be considered by the ISBS awards Committee for 2021, and successful candidates will be announced at this year’s online Conference.
Highlighting a bright future for ISBS Students

Stephanie Moore; ISBS Student Representative

The Student Vote

Following the hard work of Johannes Funken (Student Director 2018-2020), the vote was put forth to membership in early 2021 to formally extend voting rights to the student members. With its approval on the 15th of March, the changes enable all students to directly contribute their votes on societal changes and officer appointments. The specific changes include:

- The appointment of a second student representative on the Board of Directors
- The ability to vote over the appointment of the Board of Directors
- The ability to vote over future constitutional changes

These are big steps for our student-members and their role in our society!

Fireside Chat: Building ISBS Friendships

"That was great fun and a completely worthwhile experience. I wonder if we can do it again more frequently?"

Students were able to come together for some informal social time during the first ISBS Virtual Symposium in February. We shared space to meet and greet, relate with our experiences, and find common grounds. A student-specific survey after the meeting contained plenty of positive feedback, and interest for future meetings (100% of responses)!

Keeping in Touch

Students are slowly trickling in to the ISBS Slack Channels. We currently have 14 students in our #student-members page. We encourage all students to jump in to Slack and the group and introduce themselves! The Slack channel is a great place to reach out to students, officers, and other ISBS members for advice, updates, and general research-based questions.

Information Sharing

Ideas for an ISBS students page on the society website are in motion! Stephanie and her motivated student sub-committee are working to provide a space geared specifically for students. They aim to provide students with some important updates/deadlines, resources they found helpful in their studies, and some spotlights of ISBS students. We are looking forward to getting this online soon!

Looking Forward to the Future

With the announcement that the 2021 conference will take place online, we are sad we cannot meet in person, but excited to provide more student-specific online events. We have many great ideas for upcoming online activities and will continue to prioritize student-social and networking circles. As always, students are welcome to contact their Student Officer, Stephanie Moore (stephanie.moore@sbg.ac.at), with questions or specific ideas/needs for these upcoming meetings!
The student mentor programme has been a component of the annual ISBS conference since 2012. This programme presents an excellent opportunity for ISBS student members to meet with experts in the sports biomechanics field. Students who have participated in the mentoring programme in the previous years have found it to be a valuable part of the conference and have made excellent contacts (see the October newsletters from 2013-2020).

Each year, we do our best to match mentors and mentees based on their research interest and this year will be no exception. Mentors that take part in the programme come from a range of biomechanical backgrounds and are open to discussing research, career aspirations, or sharing their experience.

How to take part:

Participation in the student mentor programme is free of charge. Like in 2020, it will be a virtual format this year. Mentees and mentors will meet online at a time suitable to both. If you would like to be part of the programme, please indicate this during conference registration. The deadline for registering for the mentor programme is August 1st 2021.

Priority will be give to student members that are new to the programme but we will endeavour to include all interested students.
Anterior cruciate ligament (ACL) injuries are devastating events, which have severe consequences for an individual’s health and sports participation. Females are at two- to eight-fold greater risk of sustaining an ACL injury than their male counterparts, with some evidence for the non-dominant limb being potentially more than the dominant limb. Injury incidence rates are similar between pre-pubertal boys and girls, however, these diverge during the pubertal phase, with girls being at the highest risk of injury around 15 to 16 years. The anatomical and neuromuscular changes that are typically exhibited across puberty likely interact to contribute to these differences in ACL injury risk between adolescent males and females.

Previous research has linked pubertal status (pre-, circa- and post-puberty) with established biomechanical ACL injury risk factors during cutting, landing or jumping tasks. Yet, the association between maturation status and ACL injury risk factors are not fully understood, such injuries remain a serious problem in adolescent females and more work is needed to more effectively prescribe training programmes to alleviate these high risks. The aim of this study was to characterise biomechanical ACL injury risk factors during cutting manoeuvres in this evidently susceptible population and investigate how these are associated with maturational status.

We recruited 35 injury-free, female adolescents and measured 3D marker trajectories and ground reaction forces during 90-degree unanticipated cutting manoeuvres (five per limb). We quantified several biomechanical ACL injury risk factors and biological maturation (defined as the percentage of predicted adult stature). We then incorporated statistical parametric mapping to explore biomechanical ACL injury risk factors across limbs (e.g. external knee abduction moments, knee abduction, hip adduction) and their association with biological maturation.

We observed considerable bilateral differences in key biomechanical ACL injury risk factor, with higher (10.9%) ground reaction forces, higher (14.2%) peak external knee abduction moment and a more extended knee observed across the initial phases of stance on the non-dominant compared with the dominant limb. This finding may contribute towards previous observations of higher ACL injury incidence on the non-dominant (compared with dominant) limb in young females.

Additionally, a significant association was found between hip adduction angle and maturation status, with more biologically-mature females displaying a more adducted hip during 21-51% and 16-59% of stance for the dominant and non-dominant limbs respectively. Hip adduction is a key contributor to knee valgus (knee collapse; a key mechanism of ACL injury) and could be attributed to insufficient hip abductor strength, which is a neuromuscular characteristic known to decrease across adolescence in females.

Our findings suggest that training prescribed to correct for neuromuscular imbalances and particularly to target the strength, activation and neuromuscular control of hip abductor (e.g. gluteal) muscle groups could be important, especially as adolescent girls mature and approach the most at-risk period to injure their ACL.

We are very grateful to ISBS for supporting this internship, which provides excellent opportunities and experiences for developing researchers. This study has been submitted for publication and is currently under review.
The ISBS scholarship allowed Thede to join a project of the biomechanics group at the University of Salzburg focusing on the biomechanics of gait on slopes for individuals with transtibial amputation.

The project itself is thematically divided into several subprojects of gait on slopes in general, gait initiation and gait termination. All of them focus on the comparison between three different prosthetic feet and their influences on the user’s biomechanics:

For individuals with a lower limb amputation gait on slopes - including gait initiation and gait termination - is difficult to manage due to the lack of proprioception of the amputated limb and the technical restrictions of the prosthetic devices. As such e.g. the amount of possible plantar- and dorsiflexion of the prosthetic ankle joint might aid a stable stance on a sloped surface and decrease postural compensations. In ankle components with hydraulically or microprocessor controlled moveable ankle devices, the resistance of the joint for dorsi- and plantarflexion might additionally play a role in the grade of support for the user. Therefore, the aim of this project was to investigate the effect of a rigid (RIG), a hydraulic (HYD) and a microprocessor-controlled (MPC) ankle component in individuals with TTA amputation during gait, gait initiation and gait termination in the level (0°) and on a slope (5°).

Six individuals with transtibial amputation (AMP) and seven able-bodied participants (NORM) performed these gait tasks in the level and on a 5° inclined instrumented ramp using a RIG, a HYD and a MPC ankle component (Chas A Blatchford and Sons, Basingstoke, UK) (Figure 1). Outcome measures include the comparison of time series and peak lower limb joint kinematics and kinetics, temporo-spatial parameters and muscle activity of the lower trunk during these activities.

For example: In gait termination the Centre of Pressure (COP) data indicate, that HYD and MPC could provide advantages over RIG, whereas they could generate increased anterior-posterior COP movement of the trailing limb than RIG and seemingly a better transfer over the prosthetic limb (Figure 2). During gait the trunk shows for the transtibial group an increased lean towards the prosthetic side during downhill gait.

Based on the work carried out to date, a conference (ISPO) abstract was submitted 2019, a full journal article is under preparation for submission to Sports Biomechanics, my master thesis is on its way and it is planned to present a conference abstract for the ISBS 2021 in whichever form this might happen. For me - as a master’s student of the German Sports University Cologne- the scholarship gave me the opportunity to connect my study program directly with the practical work and thus improve and expand my biomechanics skills. Furthermore, I was able to expand my specialist knowledge immensely for my intended future career in the field of orthopedic technology, especially for prosthetics. Two points that improve my resume and perhaps set me apart from other competitors for future jobs. I immensly thank ISBS for this great opportunity!
I am grateful to the society to have been granted the opportunity to take part in a project designed to further the understanding of the biomechanics of bend running. In collaboration with Professor Joseph Hamill and Dr Gillian Weir (University of Massachusetts), Professor Gareth Irwin and Dr Hans Von Lieres Und Wilkau (Cardiff Metropolitan University) and Dr Tim Exell and Jonathan White (University of Portsmouth), the bend running project was developed to build on research conducted by Professor Hamill in 1987 which assessed the effects of track turns on lower extremity function. The funding contribution from ISBS allowed me to travel to Cardiff Metropolitan University to undertake data collections in January 2020.

The collection set up was ambitious and required two capture volumes, one on the straight and one on the apex of the curve of a 200m indoor athletics track. A comprehensive data set, consisting of bilateral kinematic data (VICON), lower-limb EMG data (Delsys) and tibial inertial data (IMeasureU) was collected. Experienced and non-experienced track runners sprinted at approximately 85% max in lanes 2 and 4 on a flat and banked track. Although I had experience using all the equipment, involvement in this project gave me the chance to upskill on the preparation that is required for such a large collection, in addition to the more technical knowledge required for the integration of multiple technologies.

With the global aim of furthering our current understanding of how the human body organises itself to sprint around a bend, the group has formulated a number of underpinning research questions of interest. The questions are each informed by a sub-set of the collected data and consider many of the important biomechanical components which contribute to sprint bend running. Subsequently, a set of research papers are in progress that the team will look to publish over the next year. Informed by the varied expertise within the working group, the work will range from addressing theories of human motion to practical sporting applications and considerations for bend sprint technique development.

The ISBS mobility grant has played an important part in my early research career in both the knowledge I gained of comprehensive data collection, processing and analysis as well as in the collaborative international working group that has been developed as a result. I am incredibly grateful for this opportunity and wish to extend my sincere thanks to both the society and my collaborators.
ISBS is pleased to announce that the **Student Research Grant, Internship Grant and the Mobility Grant** will all be available in 2021! These grants have been developed to support the research activities of ISBS members. Brief information relating to all three grants are provided over the next two pages. **Full details of the grants and application processes are available under the ‘Grants’ tab of the website: www.isbs.org/grants. Please note that the deadline for all applications is April 15 2021.**

**Student Research Grant**

The Student Research Grant is open to final year undergraduate students and postgraduate students and is available to fund biomechanics research projects in an environment that provides strong mentorship from an established researcher. The grant is designed to assist the student in the early stages of their professional development to encourage the pursuit of biomechanics research.

**Funds Available / Allowable Costs**

ISBS funds up to two awards per year, each award may be up to €1000 and is available to fund research for up to one year in duration.

Applications in one or more of the following areas are encouraged:

- Sports / Exercise biomechanics
- Paediatric / gerontology exercise biomechanics
- Development of biomechanical methods/ instrumentation
- Fundamental movement biomechanics
- Sports engineering
- Biomechanics of injury prevention and rehabilitation in sport / exercise

Funding can be used for participant expenses, lab consumables, software/hardware costs, or travel to a collaborating laboratory.

**Eligibility**

The applicant must be a student member of ISBS and supervised by an established researcher who has been a member of ISBS for at least one year.

Students must be enrolled as a final year undergraduate or as a graduate student at the time of application.
The Internship Grant will provide funds to pay a student intern to assist with the research of a full ISBS member. The purposes of the internship are to: 1) support full ISBS members (particularly early career researchers) in their research activities by providing student internship support, and 2) foster the intern student’s interest in biomechanics research and provide them with an opportunity to become familiar with research techniques and collect data under the guidance of an ISBS researcher.

**Funds Available / Allowable Costs**

The amount paid will be €250 per week for students living away from home or €150 per week for students living at home for 4-8 weeks and is administered by the host institution. Other research expenses are not payable. Student interns are offered one year’s free ISBS student membership.

**Duration / Eligibility**

Projects should be achievable in 4-8 weeks – students should be working on a specific project and details of what is intended to be achieved within the time frame is required at application. Students should currently be enrolled as an undergraduate or taught masters student (PhD students are not eligible as student interns). Applicants must have been ISBS members for three consecutive years.

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The Early Career and Developing Researcher Mobility Grant will provide funds to support full ISBS members to travel to an ISBS member’s or applied organization’s lab. Alternatively, when the applicant is unable to travel due to family obligations or medical reasons, this grant may be utilized to fund an ISBS full member to visit the applicant’s lab. The purpose of this grant is to allow the applicant to learn new techniques, collect data, develop research skills, bridge the gap between research and practice and build collaborative sports biomechanics networks. Visits may be to a research lab or applied organization that utilizes sports biomechanics (e.g. National Governing Body or footwear/equipment manufacturer).

**Funds Available / Allowable Costs**

Up to €2000 is available to support travel costs and accommodation / subsistence. Full anticipated costings and details of other current financial support should be provided with application.

**Duration / Eligibility**

Fundable visits are for a duration of 4-8 weeks.

Early Career Researchers should be < 3 years post-PhD graduation (not including verified absence due to sickness, maternity, paternity) and Developing Researchers > 3 years post-completion of PhD.

Applicants must have been ISBS members for three consecutive years.
Following the online ISBS 2020 Conference, ISBS held its inaugural Virtual Mid Year Symposium on February 4 and 5. This new initiative for ISBS members was an opportunity to connect and share research and ideas. A total of nine sessions were live streamed on the society’s Zoom platform ranging from sport specific (Sprint Biomechanics, The Biomechanics of Baseball & Softball Pitching), sport biomechanics topics (The Mechanics of the Female Athlete, Biomechanics Support for Elite Sport, Neural Networks), and general sessions (Biomechanics Teaching, Student Fireside Chat, Mother’s Café, Womxn in Sport Biomechanics). Most sessions were two hours in length and provided participants the opportunity to ask questions via the chat function. The organisation of the Symposium was a group effort by the Symposium Organising Committee who confirmed speakers, moderated sessions, organised the publicity/social media and provided IT support for all.

This Symposium allowed for new professional partnerships to be confirmed despite its online medium. The recently formed American Baseball Biomechanics Society (ABBS) collaborated on a session, also providing their members with access to the session. In addition, the Womxn in Sport Biomechanics session was supported by the Advancing Womxn in Biomechanics group. We hope that these affiliations will continue in the future.

A total of 230 ISBS members registered to attend at least 1 session over the two days. All recorded sessions are now available for all ISBS members to access [here](#) (sign in required).

A survey following the Symposium was sent to all registrants. Thank you to all who responded! Comments about the Symposium were overwhelmingly positive and 98% of respondents would be interested in attending another online Symposium. Nevertheless, members identified improvements which will be considered in future symposia: more varied time zones, other suggested topics, and earlier announcement of the event.

For this reason, we would like to announce:

**The 2nd ISBS Mid Year Symposium will take place on February 2-3 GMT 2022!**

The Symposium Organising Committee will endeavour to confirm topics as soon as possible.
Recent analysis of the ISBS members stats in 2020 revealed the following breakdown for gender:

- **Student Membership** – 52% male, 48% female
- **Professional Membership** – 74% male, 25% female
- **Life Membership** – 81% male, 19% female
- **TOTAL membership** – 67% male, 32% female

These statistics suggest that either female members do not remain a part of the society post-graduation, or we attract more male members post-graduation than female members. Similar statistics have been found in other biomechanics societies. Whilst ISBS has commenced various initiatives to support female members in staying connected to the society, as mentioned below, a survey has been sent out to previous ISBS members (all genders) to identify their reasons for not staying a part of the society. Results of this survey will be shared with ISBS members in the future.

**Current ISBS initiatives**

* **ISBS ECR Mobility Grant** — Conditions of this grant have been altered such that when the male or female applicant is unable to travel due to family obligations or medical reasons, this grant may be utilized to fund an ISBS full member to visit the applicant’s lab for 4-8 weeks.

* **Womxns circles** — A circle is a group of 5-6 members at varying stages in their careers. The purpose of a circle is to connect members and provide an encouraging environment to get and give peer mentorship for personal development. The circle provides a safe space to share experiences, provide advice, build each other up, and support each other. ISBS currently has 5 active circles! See p.20 for more information regarding the circle groups.

* **Caregivers membership** — A one-year membership fee waiver for (male and female) members who have taken caregiver leave of at least 12 weeks in the past 12 months. We are pleased to announce that the first member has already been granted this membership for 2021. More details can be found on the ISBS website isbs.org/membership.

* **Mother’s Café** — An informal meet up of current and future mothers to meet, support, and share stories. The 3rd Mother’s Café was held during the Mid Year Symposium and a separate slack channel has also been created to keep these connections.

* **Code of conduct** — A poll during last year’s Womxn in Sports Biomechanics event identified that several members had experienced inappropriate behaviour due to their gender at our ISBS conference. The ISBS board is currently composing a society-wide code of conduct to be applicable to all ISBS related events. In addition, a protocol for the reporting of harassment during ISBS events is being developed with the ambition to have it in place by the next ISBS conference.

For more information about any of these initiatives, or to share ideas for future initiatives, please contact Ina Janssen at vpresearch-projects@isbs.org. Or send a message via the ISBS slack channel.
ISBS Womxn’s Circles

Dr Hannah Wyatt

‘When women support women, we accomplish amazing things.’
https://leanin.org/together

What it is...

ISBS Womxn’s Circles were initiated in late 2020 following the inaugural ISBS Womxn in Sports Biomechanics event. The purpose of a circle is to provide an encouraging environment for personal development through peer mentorship. Each circle includes members at varying stages in their careers and experiences (student, post-doc, early-career, senior academic, industry, applied sport), providing a unique opportunity to connect those who otherwise may not have the opportunity to.

How it has been going...

To date, we have 5 active circles of 5-6 members who regularly connect with the aim of meeting 6-12 times per year via a virtual platform. Each circle comes up with their own topics for discussion and have included examples like imposter syndrome, how to find a job after graduation, discussion of the mentoring session from the symposium, celebrating successes and personal challenges.

Comments from members...

“Womxn’s circles is a great way to stay engaged with the ISBS community in an informal way throughout the year. It is fascinating to hear about the differences in sports biomechanics across the world from the PhD level, postdoc, early career, established researchers, and industry.”

“I know that when I have struggles throughout my career I will have mentors and friends that I can reach out to that will be able to help me deal with challenges.”

“I think the diversity of our group is a great strength and I feel more connected to the biomechanics community because of these amazing womxn! It is really comforting and exciting to know that I will have friendly faces to meet at future ISBS meetings!”

“Our circle is passionate about biomechanics, willing to share experiences, listens and provides advice to each other.”

“From the moment we started our first meeting, I knew this would be a safe place to share my experiences, struggles without judgement.”

“It is great having a mentoring group to further our networking within the ISBS community which allows us to share different perspectives and support one another no matter our career stage.”
ISBS Womxn’s Circles

Dr Hannah Wyatt

“Our group made it a priority to set personal goals between our monthly meetings, so we have a really nice space for accountability and for facilitating our growth.”

“We have set aside time in each of our meetings to share our wins. I didn’t realize how I’ve forgotten to take time to be proud and appreciate my accomplishments – most days I finish something and immediately pick up the next task in the PhD “to-do” list... it’s been a great space for celebrating one-another!”

“It’s been great to hear all the unique and successful stories from how our group members got to where they are in their careers – it really opens the perspective of a PhD student to the number of opportunities and options awaiting us after school.”

“It’s a great ISBS initiative! We can share our stories, either personal or work-related, ask any questions and, most importantly, have a good laugh.”

“It provides a safe space for mentoring, sharing experiences and supporting each other in an informal setting and connect with colleagues from all around the world and know about their journeys.”

“I’m always looking forward to the next one!”

If you’re in a circle...
Did you know you can create a private channel within the ISBS Slack space to share resources and messages with your circle? Keep in contact with us to let us know how the society can support you and your circle (vpresearch-projects@isbs.org).

If you want to join a circle...
Send an email with your details and career stage to vpresearch-projects@isbs.org.
I find it difficult to believe that 12 months ago (at the time of writing) we were all looking forward to meeting in Liverpool for ISBS 2020, unaware of how much our methods of working, sharing science and meeting with friends and colleagues were about to change. As an executive board and working with the conference organizing committee, it was a very difficult decision at the time to postpone the Liverpool conference but even at that time I was confident that we would be able to meet in person for our 2021 conference. As unpredictable as the past year has been, it has become clear in recent months that, even having delayed the conference date to later in 2021, it will not be logistically possible to host a conference in person for a second year running, which is a great shame for the Canberra organizing committee and us as ISBS members who will not be able to join them in person for what promised to be a fantastic conference. The consolation this year is that there is enough time to organize a full and live conference programme, building on the huge success of the inaugural mid-year symposium that took place in February 2021. The Canberra organizing committee have been working hard to transform their programme to an online format and I am hugely excited about the opportunity to come together virtually as a society, meet with friends and colleagues within the society and share science and social discussions under the umbrella of sports biomechanics. Details are being finalized around the conference format and will be updated on the website (www.isbs2021.org) soon. The organizing committee are trying to offer many of the usual highlights of our annual meeting, albeit in a different format, including:

- World-leading Keynote lectures
- Conference award lectures (including New investigator and emerging researcher)
- Live podium presentations
- Social discussions
- Student mentor and social programmes
- Sponsor and exhibitor showcase
As mentioned by Tim, ISBS 2021 will be held virtually this year. We had delayed our decision in the hope that it could be run face-to-face, however, it had become evident that this would not be possible. We are still committed to running a conference that reflects the tradition of past ISBS conferences and formats. The Dyson Lecture will be delivered by Senior Professor Julie Steele, the Hans Gros and the New Investigator Awards (NIA) will also run as per usual. The congress will be run across multiple time zones, with all presentations delivered live and recorded.

We are currently working on finalising the key note speakers, as well as developing interactive panels, with announcements on these to be made in the coming weeks. We are hoping that abstract submission are now open and will run through to the 16th of April 2021, with the possibility of an extension (there will be no extensions for the NIA awards). As well as live oral presentations, there will be a poster presentation option, which will require presenters to pre-record a 2-3 minute overview of their poster (to a single slide, or poster). Please refer to the conference website for all updates moving forward (isbs2021.org). We look forward to welcoming you online to ISBS in 2021.
Society Sponsors

The ISBS would like to thank our long-term corporate sponsor: Vicon. This sponsor provides important support to the mission of ISBS through their quality products and financial support to the Society. We encourage you to consider this fine vendor of sports biomechanics research equipment and software when purchasing or updating your lab equipment. Check out their website at https://www.vicon.com/, and make sure to visit their virtual stand at our annual conference organised by the University of Canberra, Australia (3rd to 7th of September 2021).

Mid-Year Year Symposium Sponsor

The first ISBS Mid-Year virtual Symposium organised on February 4th and 5th has been proudly sponsored by Simi. Their participation helped us to organise this event. For many years, Simi has provided valuable and sustainable support for scientific research generally and sports biomechanics in particular. Visit their website at http://www.simi.com/ to discover their latest advancements in motion capture.

Affiliated Societies

ISBS is currently affiliated with three societies; the European Society of Biomechanics, Société de Biomécanique and Arab Society of Biomechanics and Motor Behavior. This is an exciting opportunity for all and we look forward to working closely with these learned societies to grow the discipline of sports biomechanics. As part of our affiliation with each of those societies, members of ISBS can avail of the same conference registration fees for these conferences of ESB, SB and ASBMB. This year, the ESB2021 congress is organised by Politecnico di Milano and will take place Online from 11th to 14th of July (https://esbiomech.org/conference/esb2021/). The SB2021 conference will be held in Saint Etienne (France) from 25th to 27th of October (https://sb2021stetienne.sciencesconf.org). Two prominent members of ISBS, Prof. Benedicte Vanwanseele and Prof. Walter Herzog, will give a keynote presentation during SB2021.

Sports Biomechanics Twitter account

Sports Biomechanics, the official journal of ISBS, has a very active Twitter account animated by ISBS member Dr Stuart MacErlain-Naylor from the University of Suffolk, UK. All new research are posted as they are accepted or published. I encourage you all to follow this account (https://twitter.com/sportsbiomech?lang=en) if you have not already, like, retweet and comment the research being posted. The dissemination of our activities to the wider community is a key part of our society ethos to bridge the gap between research and practice, so taking few minutes to browse and share helps to achieve this goal and grow our discipline further.
Update from VP Public Relations

National Biomechanics Day 2021

This fifth edition of the National Biomechanics Day will be organised virtually on April 7th 2021 by the Biomechanics Initiative, Inc. The Biomechanics Initiative, Inc. is a non-profit organization founded and directed by Prof. Paul DeVita, former President of the American Society of Biomechanics, to promote biomechanics science and education by increasing the awareness and appreciation of biomechanics among the high school community around the world. The mechanism through which this goal is achieved is to teach young people about biomechanics and thereby expand the number of people entering biomechanics and creating careers in biomechanics.

This fifth edition promises to be very innovative. A great benefit of a virtual organisation is allowing collaborations across vast distance such as unified events among multiple labs.

ISBS is a proud sponsor of this event. Several ISBS members have already registered events on or around April 7th on the website of the Biomechanics Initiative, Inc. All the NBD events happening around the world are showcased on the NBD 2021 landing page. Check out this page and follow the links to Biomechanics-STEM & STEAM events, either live or pre-recorded. If you are hosting an event, please register online, and if it is possible send through details and image of your event to me via email (floren.colloud@univ-poitiers.fr) for inclusion in our October ISBS newsletter.

All the best, Floren

Short Communications

ISBS Proceeding Archive

ISBS has recently received a donation of archived ISBS Newsletters which were published pre 2000. Sincere thanks goes to Professor Julie Steele, University of Wollongong, Australia for donating these important historical items to ISBS. Professor Steele also sponsored shipment of these items to VP of Publications Dr Sarah Breen. The newsletters are currently being digitized and will be available soon on the ISBS website: https://isbs.org/news/newsletter
Despite being 2021, girls and women are still underrepresented in science, technology, engineering and mathematics (STEM) education and careers, including biomechanics. The causes of this gender inequality in STEM participation are broad and complex. Factors such as bias, stereotyping and a lack of female role models can greatly influence girls’ and women’s decisions to enter and remain in STEM education and careers. We were, therefore, very excited when Biomechanics Research Laboratory (BRL) PhD student, Maddison Kirk, was awarded a National Biomechanics Day Outreach for Women in Biomechanics grant. The grant’s purpose was to host an event specifically designed to promote biomechanics to girls and women in an immersive, interactive and engaging manner.

To maximise female participation, we invited two teams from the Sutherland Stingrays Netball New South Wales (NSW) Premier League Franchise to participate in our NBD event. Twenty female players aged between 15–25 years and their coaches eagerly accepted the invitation. Despite the Premier League being the pinnacle of netball competition in NSW, the participants had limited or no previous access to any systematic assessment of their physical performance using biomechanical tools. This lack of scientific support for female sport is, unfortunately, unsurprising. We therefore saw this event as an ideal way to immerse female athletes in activities with a strong biomechanics flare and that were highly relevant to this eager cohort. Maddison, mentored by Professor Julie Steele and assisted by undergraduate student Paige Penrose and research assistant Emma Houghton, provided female role models for the participants. Creating diverse, strong role models is vital to ensure women in biomechanics are visible and, in turn, help address the bias and stereotyping that currently exists. The Director of the BRL, Joshua Mattock, and other male BRL team members, Dr James Forsyth and Jarred Cooper, were strong allies throughout the event, helping to run the activities. To facilitate access, we travelled to the Stingrays’ training venue to host the event at a time that suited the participants.

We assessed each player’s physical performance using various tasks, such as the isometric mid-thigh pull to evaluate lower limb strength, countermovement and drop jumps onto portable force platforms to assess vertical jump height and landing technique, and timed sprints and changing direction efforts to determine...
speed and agility. Some players also had their foot shape quantified (3D foot scanning) and measured the forces they generated while performing a variety of netball tasks (using Novel loadsols®). We are currently analysing the physical performance data. Once completed, we will discuss the results with each participant and her coach to tailor individualised fitness and injury-prevention programs for each player.

With the players’ permission, Maddison has posted photos from the NBD event on social media, and a video highlighting the event will be released later this month. These photos and video will further increase the positive exposure of female players participating in biomechanics activities to a broad audience and showcase women running these activities. We hope this increased visibility of STEM careers will ensure girls and women are aware of the many different pathways a STEM career, particularly in the field of biomechanics, can take. By diversifying biomechanics and ensuring STEM is representative of the society in which we live, we have the opportunity to achieve much more and make substantial advances globally.

Acknowledgement: We thank The Biomechanics Initiative and ISB for funding this National Biomechanics Day Outreach for Women in Biomechanics grant.
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ISBS Officers & Directors

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Student Representative
Duane Knudson

Fundamentals of Biomechanics

• New to this edition
• Alignment with updated national guidelines for the introductory biomechanics course
• More examples of quantitative biomechanical analysis and current data collection equipment
• Updated examples and citations of the latest biomechanics research
• Updated and revised color drawings and graphs

This third edition introduces the exciting world of how human movement is created and how it can be enhanced. The book presents a comprehensive review of the major concepts of biomechanics and summarizes them in nine principles of biomechanics. Throughout the text are numerous examples of applying these principles to the work of kinesiology professionals with references to current biomechanics research. Specific case studies illustrate how biomechanics principles can be used in evidence-based practice by professionals to modify movement in teaching/coaching and exercise/rehabilitation settings. This text presents a clear, conceptual understanding of biomechanics and is designed to help students through active learning lab activities to link their personal experience to biomechanical concepts. Biomechanics instructors, researchers, and other professionals helping people to improve movement and decrease the risk of injury, as well as advanced students learning biomechanical principles in biomedical engineering, ergonomics, kinetics, physics, and sports physiology will find Fundamentals in Biomechanics, 3rd edition invaluable.

Key Features:
Detailed examples of biomechanical principles and their application in the qualitative diagnosis of human movement in a variety of professions
Over 160 figures illustrating real human movement
Case studies of actual movement technique examined by professionals in human movement
Extensive use of graphs, photographs, illustrations, and citations to important biomechanics literature
Glossary of key terms and biomechanics research terminology Appendix of instructional lab activities

Endorsement of the 2nd Edition:
"Fundamentals of Biomechanics delivers everything it promises, and more. The challenge of teaching and learning biomechanics is understanding the two distinct fields that it comprises - biology and mechanics. In my experience, some students enter biomechanics with aptitude and interest in one of these fields and reluctance to the others. As a leader in biomechanics, Dr. Knudson seems to realize this and does an expert job of teaching these two fields in separate parts of the textbook. The text is clearly written, and includes many helpful illustrations and examples."
- Glenn S. Fleisig, Ph.D., Smith and Nephew Chair of Research, American Sports Medicine Institute, Birmingham, AL

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