ISB

International Society of Biomechanics Newsletter

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From the President, Sandra J. Olney

International Biomechanics in a Changing World

Many thanks should go to Past President Kit Vaughan for his superb leadership as President over the past two years, and for the hard work of the members of the Executive Council. Special thanks go to Mark Grabiner who assumed the very demanding responsibilities of Newsletter Editor. Kit Vaughan and the Executive Council are due particular thanks for the extra work they assumed at ISB2001, which I was unable to attend for medical reasons.

It is a great privilege to be speaking to you for the first time as the President of this organization. I am eagerly looking forward to working with a strong Executive Council and the members of this wonderful organization that has been my academic home for over two decades. Since its founding in 1973, the ISB has matured and grown to over 1000 members from all over the world, providing a focal point of international leadership in biomechanics and human/animal movement science.

The ISB has always placed a high priority on international concerns. Officially we state, "The Society encourages international contacts amongst scientists, promotes the dissemination of knowledge, and forms liaisons with national organizations." In addition to worldwide personal members, thirteen national biomechanical societies are official Affiliate Societies of the ISB. In the Codes of Operation of the Affiliate Societies we state the primary purpose of the International Society of Biomechanics is "to promote and stimulate the development of biomechanics at the international level." In this context, the ISB has recognized that many national and regional societies of biomechanics and related topics exist in various parts of the world, and sometimes several with sub-disciplinary interests exist in a single country. The ISB recognizes that progress in the quality and scope of biomechanics research is dependent upon mutual co-operation and support from all of these groups and has promoted Affiliate Society membership. International interaction has been greatly facilitated by support of BIOMCH-L, an e-mail discussion group for biomechanics and human/animal movement science.

The events of September 11, 2001 in the USA mark a sharp change in many aspects of our world, regardless of where we live. Already, less than two months later, there are major changes in policies and activities of our governments and in the attitudes of our citizens, which affect each of us. One of the most obvious effects is attention to security at all levels. Travel may become more difficult and expensive than it was in the past. Some colleagues have ceased traveling altogether, at least for the present. But perhaps more importantly, the additional uncertainty about the economic health of most countries gives little hope of relief from the financially hard times most universities and other research centre have been experiencing over the past decade. As government emphasis shifts to wartime efforts, we can expect further change to education and research budgets.

There is also a tendency to balkanization in times such as these with nations being divided into those regarded as friendly or, to say the least, with some suspicion. With high needs for safety and a sense of security it is easy to retrench within our borders and to distance ourselves from others. The increased separation can further fuel the forces that increased our separation in the first place. With economic uncertainty, government funders of universities may more frequently justify the exclusion of non-resident students or impose prohibitively expensive conditions for their acceptance. In turn, this increases the distances between us and works again the trend toward mutual collaboration that has been made possible by the development of electronic communication.

It is timely to reexamine our role in internationalization and explore further its many implications. We are an International

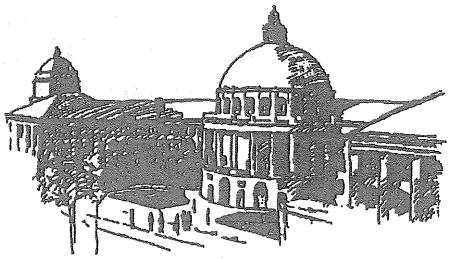
Society of academics from all over the world. Now is the time to defend the values on which we were founded and to make special efforts to maintain and enhance our cross-national focus. My experience in international work has led me to value international education as well as international collaboration between academics.

We value international education both for students who ultimately make their homes in the adopted country and those who return to their home countries. My eyes fall on the theses of the many students my colleagues and I have supervised over the years. Many of these were international students. Usually international students are both the most demanding and the most rewarding. After convocation some remain in their adopted country, adding their own special diversity to our academic and professional culture, but many return home to advance the academic development of home universities. As an invited speaker at a conference in Brazil a few years ago, I was struck by the number of academics that had been my students or those of my colleagues at my own university and from across Canada. By any measure, their influence on the development of academic strength in their home country is substantial. I recall the father of three, a doctoral student on a mid-eastern country government scholarship who I was not sure would make it through unpredictable financial support, serious family problems and personal illness. Returning home, he proudly told me of the development of his laboratory and recently informed me of the graduation of his first doctoral student. We can all recall many such examples of the worth of international education: biomechanics spreading around the world.

Second, we value collaboration of academics across cultures. There are a number of reasons for this. First, our discipline is relatively small; it is quite likely that many of your closest academic colleagues are not from your country. The ISB has recognized that to promote international development of the field, congresses must be held in different countries. A second reason for valuing collaboration across cultures is to produce solutions to human problems that one could not produce on its own. A few years ago the Technology group of the International Centre for Community Based Rehabilitation at Queen's worked with several groups in India to develop and disseminate the design of an appropriate technology to provide home mobility for disabled rural women. Partnering our expertise in biomechanical engineering and rehabilitation with a design group in India that had no experience with disability, innovative and elegant solutions were produced using this multi-disciplinary, multicultural approach. Each group learned from the other. Another project developed a hinged lower limb orthosis through a partnership of members of the two countries, including assistance with development of materials from a helpful Defense Department. In a third example, colleagues are working with a group in Central America using hi-tech biomechanical designs, innovative materials and methods to produce an inexpensive high-performance prosthetic foot. Members would be able to report on a myriad of solutions to human problems that could not have been accomplished without international collaboration.

Academics throughout the world share a common culture that transcends national borders. The values of academics of very different countries are frequently closer to each other than to other groups within their own country. In Afghanistan not long before it fell to the current government, I saw classrooms of young women and men studying with scant help from a library consisting of two small bookshelves about six feet long and four feet high. In the words of an Afghan woman, "I don't regret very much losing my furniture, dishes, carpets, linen or any of the other nice things in my house – just my books." Valuing education, the development of new knowledge and its application to enhancing human life, academics can reach through

borders that others cannot. What an enormous asset! Reaffirming our values, the ISB has important work to do in these troubled times.



Facts and Figures
XVIIIth Congress 2001

A. Stacoff (vice-chairman); R. Müller (secretary-general) of the ISB2001 congress

A few months after the congress, the ISB2001 Congress Committee can now look back on a very successful congress. Here some facts and figures which may be of interest to you. We originally received 963 abstracts which were cut down to 850 during the review process (Table 1). This equals a rejection rate of 11.7%, which is, in view of ISB tradition rather high. We believe however, that this procedure helped to improve the overall quality of the congress

Table 1 shows the statistics with respect to the number of presentations per topic. Most presentations were in the area of Orthopaedic Biomechanics and Rehabilitation. There may be two main reasons for this: First, Orthopaedic Biomechanics is very important in Switzerland, and second, the influence of the European Society of Biomechanics (ESB) which is strongly oriented towards Orthopaedic Biomechanics and thus a considerable number of ESB members may have decided to come to the Zurich congress. It is interesting to note that locomotion, also a orthopaedic oriented topic, placed third, just behind Sports Biomechanics, with a long tradition within the ISB. Furthermore, when considering Neuromuscular Control and Soft Tissues (with presentations on Muscle tissue) together, one might find also a trend of interest towards muscle related contributions. Lastly, it was the intention of the Zurich ISB Congress to invite also new subjects such as Biomechanics of Cells and Membranes, Forensic Biomechanics, Biomechanics in Space, and Shoulder Biomechanics (in form of a Symposium).

Abstracts		
Submitted abstracts	963	
Accepted abstracts	850	
Oral Presentations	388	
Poster Presentations	462	
Number of presentations per topic		
Orthop. Biomechanics & ligaments	188	22%
Sport Biomechanics	148	17%
Locomotion	118	14%
Neuromuscular Control	92	11%
Soft Tissues: Muscle, Cartilage & Lig.	68	8%
Other Topics	58	7%
Hard Tissues: Bone, Joints and Spine	56	7%
Implants and Biomaterial Aspects	34	4%
Biofluidmechanics	31	4%
Forensic Biomechanics	16	2%
Keynote Lectures	13	2%
Biomechanics of Cells & Membranes	10	1%
Biological Remodelling Processes	10	1%
Biomechanics in Space	8	1%
TOTAL	850	100

With respect to the number of participants at the congress in Zurich we have the following figures (see Table 2): There were a total of 865 participants of 44 different countries. It is interesting to note that only 33% of these participants were actual ISB members.

There were 20 exhibitors present. Overall feedback of the exhibition was very positive; the new schedule (Sunday evening to Wednesday noon) was found attractive, both from the exhibitors side as well as from the participants side.

The organising committee would like to thank all those who made a contribution to the congress. We could only organise the framework of the congress, but the actual content was filled by the 850 contributions.

With respect to the Award List of the July-August Newsletter (number 81) there are the following additions to make:

Asia Award (NAC Inc. & Prof. Miyashita)
K. Azuma, I. Muraoka, Y. Nakamura, A. Kagaya, T. Fukunaga, Waseda University, JWCPE, University of Tokyo (Saitama, Tokyo, J).

Scherb Award (ISB2001, Ares-Serono SA, F. Hoffmann-La Roche AG, Novartis Pharma AG)
M.R. Torry et al (see Newsletter 81) and I. Kramers-de Quervain, R. Tunesi, G. Luder, E. Stuessi, A. Stacoff, Biomechanics ETH Zurich (Schlieren, CH).

Lastly, the Book of Abstracts, containing 850 short abstracts (CHF: 80.-) is still available. Just send the according check to the following address:

Laboratory of Biomechanics
Book of Abstracts ISB 2001
Wagistrasse 4
8952 Schlieren
SWITZERLAND

Country	Delegates	Abstracts
Australia	32	41
Austria	19	26
Belgium	14	12
Brazil	14	16
Bulgaria	1	1
Canada	55	63
China	8	6
Czech Republic	3	3
Denmark	14	14
Estonia	1	3
Finland	4	3
France	54	58
Germany	62	68
Greece	11	11
Hong Kong	5	6
Hungary	4	4
India	0	1
Iran	4	5
Ireland	2	1
Israel	22	18
Italy	36	36
Japan	79	70
Korea	2	4
Latvia	0	1
New Zealand	9	8
Norway	3	2
Poland	14	10
Portugal	4	3
Romania	0	2
Russia	1	3
Scotland	2	0
Singapore	3	2
South Africa	3	5
South Korea	3	0
Spain	3	4
Sweden	10	6
Switzerland	121	65
Taiwan	25	23
Thailand	2	2
The Netherlands	31	30
Turkey	3	3
United Kingdom	65	65
USA	115	142
Yugoslavia	2	4
TOTAL	**865**	**850**

Call for Proposals for XXth ISB Congress (2005)

Mary Rodgers, ISB President-elect.

Persons or groups interested in organizing an International Congress on Biomechanics are invited to prepare and submit a formal proposal to the ISB Executive Council. Included in the proposal should be:

1. *Organizer*
   Describe research interests and activities of the proposed organizer(s) and explain, why you desire to organize the Congress. Provide a description of your institution or department with its principal research areas.
2. *Dates*
   Indicate the exact dates proposed for the Congress. Careful consideration should be given to university vacation periods in major countries, and the attractiveness of visiting your region at that time of the year.
3. *Support*
   Outline sources of financial support such as government, university, institutes, industry, sports organizations, etc. If possible enclose a letter of support from the chairman of your Department, Institute Director, President of the University or a similar official. Add a list of professional organizations willing to sponsor the Congress.
4. *Personnel*
   Provide evidence of the availability of organizational personnel such as secretaries, travel co-ordinators, business managers, etc.
5. *Budget*
   Submit a provisional budget including the major financial arrangements. Indicate the estimated congress fee for participation of members and non-members and list the activities included by this fee.
6. *Facilities*
   Provide details of the following:
   a. Housing. Type and approximate cost of accommodation, proximity to Congress meeting place.
   b. Meals. Location and cost.
   c. Meeting rooms. Number of meeting rooms available for the congress, audio-visual systems, capacity of rooms, etc
   d. Recreational facilities available to participants. Sport fields, swimming pool, running track, exercise room, gymnasium, etc.
   e. Book and equipment exhibit area(s). Possibilities for book and equipment exhibitions.
   f. Research laboratories, planned tours, demonstrations, etc.

Travel arrangements

Outline the different ways to travel to the Congress, by air, train, bus, boat, private car, etc. Name candidates for official travel agency and airline, if appropriate. Make provision for travel assistance to participants during the congress.

Advertisements

Detail your plans for promoting and advertising the Congress.

*Reviewing*Describe your plans for the reviewing of submitted abstracts and the preparation of the Book of Abstracts.

Publication

Indicate your plans for editing of manuscripts and for publication of the key-note and award-winning papers.

Activities

Mention the historical and cultural activities available to participants during or after the conference. Also include your plans for special programs for accompanying persons.

Climate

Describe the climate to be expected in the area for the period of the proposed Congress.

Two copies of the proposal should be submitted by April 1, 2002 to:

Mary Rodgers, PhD, PT
Professor and Chair
Dept. of Physical Therapy
University of Maryland School of Medicine
100 Penn Street
Baltimore, MD 21201
Tel: (410) 706-5658
Fax: (410) 706-4903
mrodgers@umaryland.edu

Descriptive brochures and other helpful information material should be included. Each proposal will be reviewed and compared to other proposals by members of the Executive Council of ISB. The final decision will be made by the Council of ISB during its annual meeting, in July of 2002.

International Society of Biomechanics (ISB) Student Grant Guidelines

Student members of ISB are eligible for the following three grants. A number of competitive grants will be awarded each year. All grant amounts are shown in US dollars.
Note: Application forms can be downloaded from the ISB hompage:

http://www.isbweb.org/

1) The Matching Dissertation Grant Program:

There will be several competitive grants of $2000 made for doctoral dissertation research. A condition is that the applicant will have a commitment from her/his institution or another source to provide a further matching $2000. This program is applicable to those who are doctoral candidates and are seeking assistance with costs of their dissertation research. Applications should include the following:

g. a three page summary which includes the purpose, hypotheses, reference to key related literature, study design, methods, timetable for the measurements and budget;

h. a CV of the applicant: 2-3 pages in length (including list of publications, current grade point average, results of any standardized tests (e.g., GRE));

i. a document from her/his institution or other source which ensures provision of the matching $2000;

j. a one page recommendation from the dissertation advisor who must also be an ISB member at the time of application.

Applications are to be received by **January 25, 2002**. Notification will be by March 29, 2002. Recipients will present results at the next ISB Congress in 2003 and acknowledge ISB support in any publications. A report to the council will include accounting of how funds were spent. Recipients will be encouraged to publish their work in one of the ISB-affiliated journals.

2) The International Travel Grant Program:

To encourage student members to travel abroad to experience science in other cultures, we will offer several grants of $2000 for travel related to biomechanics research. A report on the accomplishments during the trip will be expected by the committee. Applications should include:

a. a three page proposal which includes the purpose of the visit, timetable, activities to be involved in, the total budget for the visit (including other financial assistance, etc.);

b. a CV of the applicant: 2-3 pages in length (including list of publications, current grade point average, results of any standardized tests (e.g., GRE));

c) a document from the host institution verifying support for the visit;

d) a recommendation letter of support for the travel from the applicant's supervisor who must also be an ISB member at the time of application.

Applications are to be received by **January 25, 2002**. Notification to applicants will be by March 29, 2002. Recipients will submit a brief report to the committee which will be published in the Newsletter.

3) The Congress Travel Grant Program:

This grant is offered only in the years of ISB Congress, therefore, this grant will <u>not be offered in 2002, but in 2003</u>. ISB Congresses provide a wonderful opportunity for

exchange of information and for meeting other scientists who can be influential in the development of new directions. By virtue of the need to move the congresses between different continents, it is often very difficult for students to afford to travel to the Congresses or to pay the registration fee if they can travel. However, we will offer several travel grants of up to $1000 to student members who will be presenting their research results at the 2003 ISB Congress in Dunedin, New Zealand. Applications should include the following:

a) a proposal which should have a maximum length of 3-4 pages including a copy of the submitted abstract and, the total budget for the travel.

b) a CV of the applicant: 2-3 pages in length (include list of publications, current grade point average, results of any standardized tests that the applicant has taken (i.e. GRE)).

c) a one page recommendation from the supervisor who must also be an ISB member at the time of application.

Recipients will submit a brief report to the committee which will be published in the Newsletter. Applications are to be received by **January 24, 2003.** Notification to applicants will be by March 28, 2003.

Final note:

- Please be aware that applications can only be accepted from FINANCIAL member applicants and supervisors.
- Please provide the ISB membership number in your application. It can be obtained from the ISB website or from Graeme Wood under: gwood@cygnus.uwa.edu.au

Grant applications should be mailed to:

Dr. A. Stacoff
Laboratory for Biomechanics
Deptartment of Materials
ETH Zürich
Wagistrasse 4
8092 Zürich
SWITZERLAND
Tel: ++41 1 633 62 18
Fax: ++41 1 633 11 24
Email: stacoff@biomech.mat.ethz.ch

Student Grant Committee:

Dr. A. Stacoff
Dr. Mary Rodgers
Dr. Christopher L (Kit) Vaughan
Dr. Gisela Sjøgaard
Dr. Peter Cavanagh
Dr. Michiyoshi Ae
Sicco Bus (Student Member)

Student members who do not plan to apply for grants, but would be interested in serving on the student grants committee are asked to contact Alex Stacoff.

Journal of Biomechanics

The **Journal of Biomechanics** is the leading forum for the publication of articles describing the principles of mechanics to explore biological problems. Papers published in the journal cover a wide range of topics in biomechanics including, but not limited to:

- **Fundamental Topics**
- **Cardiovascular & Respiratory Biomechanics**
- **Dental Biomechanics**
- **Injury Biomechanics**
- **Orthopaedic Biomechanics**
- **Rehabilitation Biomechanics**
- **Sports Biomechanics**
- **Cell Biomechanics**

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- Should you wish to subscribe to the journal at the ISB discounted member rate, please contact the society directly.
- If you would like to discuss informally a submission to the journal, or have an idea for a focussed journal issue, please feel free to talk to one of the journal Editors-in-Chief: Professor R. Huiskes (E-mail: Biomechanics.BMT@tue.nl) or Professor R. Brand (E-mail: dick-brand@uiowa.edu).

ISB Congress Travel Grant Report
Takayuki Nakamura,
University of Texas Medical Branch

I was as happy as a lark when I got an award letter from ISB board with a $1,000 congress travel grant check. I would like to thank ISB for giving me this wonderful opportunity to experience a week of scientific festival in a historical Europe city. My stay in Zurich began with strolling beautiful old streets and riding lovely trams that go all over the city. Zurich people were enjoying the big Zurifest – a festival held every three years with local cuisine, music, dance. Sunday night was a grand finale of magnificent fireworks played over the lake Zurich.

The congress went on with plenty of academic experiences. The tutorial on computational dynamics given by Dr. Heegaard of Stanford University on Sunday afternoon was a good start of the congress week. He went over several issues in computational dynamics and demonstrated their original simulation package for MATHEMATICA©. The opening ceremony was very entertaining (live music and presentation on history of ISB).

I enjoyed sessions on neuromuscular control, orthopedic biomechanics, and sport biomechanics. The upper extremity modeling session was very helpful since I am interested in developing three-dimensional kinematics model of upper limb. I have learned great deal from these talks for my doctoral dissertation research – especially from issues on joint coordinate definition, joint structure. This is a virtue of big academic meeting with participants from such a diverse, interdisciplinary fields. I think students should take advantage of the travel scholarships and enjoy this opportunity to broaden their academic perspectives.

I gave a poster presentation on Thursday July 12th. I was a little bit nervous about my talk since I only had a few minutes for my turn. I managed to finish my talk within my spare time – it was a thrill.

Again, it was such an honor to receive a travel scholarship and I appreciate ISB board member for sending me to a great congress that made my summer complete.

ISB Congress Travel Grant Report
Nicole Baker
University of Calgary

In April 2001 I received an ISB Congress Travel Grant Award. This funding allowed me to travel to Zurich in July to give an oral presentation entitled "Use of Instantaneous Helical Axes for Determining Knee Joint Centre on Magnetic Resonance Images". The presentation was based on a portion of my master's thesis project. Attending the ISB congress provided a terrific opportunity for me to present my work to a new audience with a specialized biomechanics background. By presenting to a group that was not fa-miliar with my project I was challenged to explain the project goals differently, with more emphasis on the overall objectives and future applications. I also had to anticipate many new questions. I fielded questions on the methods of data analysis that were used, key assumptions that were made in the analysis of data and the limitations of the research as it is applied in the future to study knee injuries. As a result of these questions and comments, I thought more critically about the analysis I had done and about possible changes I would make for future experiments. I also evaluated some of the new ideas that were suggested to me. Many of the comments helped me to generate new ideas for my thesis discussion.

Several people approached me after my presentation to discuss more about the work we were doing at the University of Calgary on knee joint contact mechanics of normal and injured knees. These discussions reminded me that my thesis work was valuable to the biomechanics community. Giving an oral presentation and informally discussing my work gave me confidence interacting with other researchers.

After my presentation I was free to enjoy more of the scientific program. There were several presentations discussing joint moment arms, knee joint modelling and non-invasive imaging using MRI, all of which pertained to my thesis work and allowed me to see what other research groups were doing. It was also interesting to attend talks that were completely unrelated to my thesis research. I particularly enjoyed the President's lecture at the closing ceremonies.

I was fortunate to be able to participate in the tours of Sulzer Medica and Kistler. The processes for manufacturing and testing the hip and knee implants were very interest-ing. The

Kistler tour was also informative and gave me an appreciation of the detail that goes in to building the force platforms that we use every day in our biomechanics labs. The highlight of the afternoon was the visit to Laufen Castle overlooking the spectacular Rheinfall. Thanks again to Kistler for organizing the afternoon and evening.

I would like to thank the ISB Council for this award and for giving me the chance to at-tend the ISB Congress in Zurich.

ISB Congress Travel Grant Report
Rene Ferdinands
University of Waikato, New Zealand.

I am investigating the biomechanics of bowling in cricket. This research is for my PhD thesis, and also involves two other major institutions - the University of Auckland and the Waikato Polytechnic.

The research involves the 3D motion analysis testing an elite sample of fast bowlers delivering a cricket a ball. This requires the excellent research facilities and staff expertise at the University of Auckland. An EVA Motion analysis model of the bowler was developed here, and enables the researcher to obtain 3D kinematic data from all the body segments.

The kinematic data is then used to drive a 3D fifteen-segment rigid body model of bowling, which was developed at the University of Waikato, and is capable of inverse and forward solution dynamics. This is the first time that a dynamics study of bowling has been attempted, and the results are providing real insights into the mechanics behind the bowling action, which has for too long now, been subject to little scientific treatment. As such, there has already been significant interest shown in this research by the cricket playing countries of the world.

I therefore am extremely grateful to the ISB Award Committee that granted me the ISB Travel Award, which enabled me to attend and present my research at two international biomechanics conferences – the XVIII International Society of Biomechanics Congress in Zurich, and the VIII International Symposium on Computer Simulation in Biomechanics in Milan.

The conference in Milan was very specialized, and brought together a group of quality researchers who are interested in computer modeling and simulation in biomechanics. I gained an insight into the complexities of biomechanical modeling, and had a good opportunity to listen to high quality presentations of research that is right at the cutting edge. Also, I had stimulating discussions with certain researchers on aspects of rigid body modeling and received some good tips on how to make my models more powerful and robust.

The ISB conference in Zurich was in comparison a much larger one, and covered a diverse range of biomechanical topics. It was a very exciting and stimulating experience to see how important and vibrant the field of biomechanics is becoming. I felt that I was part of something huge that could really benefit the world at large, and make a significant improvement on many physical aspects of human life. I now have a better appreciation of how to use my research to make human movement more efficient not only in sport, but in other areas of biomechanics as well.

New Zealand is very far from Europe, and also the New Zealand dollar is low in respect to the other currencies – so the whole thing is very expensive! Therefore, without this travel award, it would not have been possible for me to attend these conferences. I once again thank the ISB for giving me this opportunity, and I can confidently say that my research will be richer for it.

ISB Matching Dissertation Grant Report
Akinori Nagano, Ph.D.
Department of Exercise Science and Physical Education
Arizona State University

First, I would like to thank the International Society of Biomechanics for awarding me a Matching Dissertation Grant. This grant greatly helped me to further improve our existing computer and experimental facilities, and enabled me to work on several research projects.

When I was awarded this grant in March 1999, my primary research interests were in the function of sensory feedback in the control of human cyclic movements. The main goals of the project were to investigate EMG and H-reflex modulation during hopping using human subjects, and to simulate human hopping movements using the methodology of musculoskeletal modeling and computer simulation. Parts of the results have been presented

in the satellite symposium (VIIth International Symposium on Computer Simulation in Biomechanics) of the XVIIth ISB Congress in Calgary (Nagano and Gerritsen, 1999), and in the XVIIth ISB Congress itself (Gerritsen and Nagano, 1999). The results supported the hypothesis that afferent feedback may be playing an integral role in the synthesis of human rhythmic cyclic movements.

After working on the hopping project for about a year, I shifted the focus of my research to the function on sensory feedback in the control of human walking. I investigated the differences in the modulation of the m. soleus H-reflex excitability between overground walking and treadmill walking. As the H-reflex excitability is known to be heavily task dependent, I hypothesized that the m. soleus H-reflex excitability would be different between overground walking and treadmill walking. I carefully controlled the speed and the cadence of walking during overground and treadmill walking, and determined the m. soleus H-reflex excitability in the stance phase of walking. I tested six subjects (four males and two females) with a variety of backgrounds in sports activities at the competitive level. No statistically significant differences were observed between overground walking and treadmill walking. However, it was interesting to find that the H-reflex modulation during treadmill walking was substantially higher than during overground walking for a former national level orienteering runner (the only elite runner in the subject pool). This may warrant further investigation into how different athletes modulate their H-reflexes during the activities that they train for.

Here at Arizona State University, I had the privilege to interact with excellent faculty members of three different departments (Department of Exercise Science and Physical Education: Dr. Gerritsen (my Ph.D. mentor), Dr. Hinrichs and Dr. Martin; Department of Anthropology: Dr. Marzke; Department of Bioengineering: Dr. He and Dr. Yamaguchi). This interdisciplinary interaction resulted in a dissertation topic (May 2000) that effectively used biomechanics/engineering modeling and simulation techniques to help answer a question in Anthropology. I geared my dissertation research into this new direction and put all my energy and time in it. I successfully defended my dissertation in June 2001: "A Computer Simulation Study on the Potential Locomotor Patterns of Australopithecus afarensis (A.L. 288-1)", which we also presented in the XVIIIth ISB Congress in Zurich (Nagano, Gerritsen and Marzke, 2001; a PDF abstract is available in the CD-ROM distributed at the conference).

The skeleton of Australopithecus afarensis A.L. 288-1 (better known as "Lucy") is by far the most complete record of locomotor morphology of early hominids currently available. Even though researchers agree that the postcranial skeleton of Lucy shows morphological features indicative of bipedality, there are intense discussions regarding the manner in which she could have walked; that is, whether she could have walked in a manner that is similar to that of modern humans (upright, straight-legged locomotion) or whether she could have walked with bent-hips and bent-knees, as chimpanzees do when they walk bipedally. The purpose of this study was to address this question using the methodology of forward dynamic computer simulation. Two (one human-like and one chimpanzee-like) detailed three-dimensional musculoskeletal models of Lucy (20 degrees of freedom) were developed. These models were driven by lower limb muscles (52 for the human-like model and 56 for the chimpanzee-like model), with muscle activation profiles as the only inputs. Muscle activation profiles that produce a step of human-like locomotion and a step of chimpanzee-like locomotion, while at the same time minimizing the energy consumed per meter traveled, were searched through numerical optimization. The numerical optimization of the muscle activation profiles resulted in natural-looking locomotor kinematics. The energy consumption per meter traveled during chimpanzee-like locomotion was more than twice the amount of energy consumption during human-like locomotion. On the other hand, the chimpanzee-like locomotion was only slightly more robust against external perturbations than the human-like locomotion. Therefore, from the perspectives of both energy consumption and functional stability, it is most likely that Lucy walked in a manner that is similar to the way in which modern humans walk today.

I received good feedback when I presented this study at the XVIIIth ISB Congress in Zurich. I believe that the ISB Congress is one of the most valuable congresses for biomechanists, with so many members eager to further develop scientific perspectives. I would like to thank the ISB for their excellent scientific and financial programs that are aimed at helping graduate students establish their career in biomechanics.

Editor's Note: Not only did Dr. Akinori Nagano receive an ISB Dissertation award, but he should be eligible for a "Honesty Award"! He returned $902 of the $2,000 award he received because he did not need to use the full amount for his research.

IV world congress biomechanics

Call for Papers

The IV World Congress of Biomechanics is taking place in Calgary, Alberta, Canada on August 4-9, 2002. Scientific papers of all designations are invited for oral or poster presentation. The Congress is covering a wide range of topics including Animal, Biomaterials, Biotechnology, Cardiovascular, Cellular/Molecular, Clinical, Dental, Hemodynamics, Imaging, Joint, Locomotion, Muscle, Neural and Sensory, Orthopaedic, Plant, Respiratory, Sport, Tissue Engineering and other topics relevant to the field of biomechanics.

Authors should submit abstracts to the Congress Office as early as possible but no later than January 31, 2002. Details regarding the guidelines for abstract preparation can be found at the Congress website: www.wcb2002.com. All abstracts submitted are subject to review by the Scientific Program Committee and will, after acceptance, be assigned to either oral or poster presentation.

Congress Office:

University of Calgary
Kinesiology Department
2500 University Drive NW
Calgary, AB Canada T2N 1N4

URL: www.wcb2002.com
Email: info@wcb2002.com

XVII ISB Congress Book of Abstracts

Dr. Benno Nigg at the University of Calgary, has over 150 copies of the ISB '99 book of abstracts. He has kindly offered to make these abstract books available for free. Anyone wanting one need only pay for the cost of shipping. Please contact Glenda McNeil at:

glenda@amaretto.kin.uclagary.ca

if you are interested.

Upcoming Meetings, Workshops

2002

Seventh Annual Meeting of the Gait and Clinical Movement Analysis Society
April 17-20, 2002, Chattanooga, Tennessee, USA.
Contact: Michael W. Whittle, The University of Tennessee at Chattanooga, Tel: +1-423-755-4046, Fax: +1-423-785-2215, Email:gait2002@utc.edu, http://www.utc.edu/gait2002

2nd International Conference on Science and Technology in Climbing and Mountaineering
University of Leeds, UK
3rd-5th April 2002
http://www.leeds.ac.uk/sports_science/conference/climb2002/
email: climbing.conf@leeds.ac.uk

Fifth Israeli Symposium on Computer-aided Surgery, Medical Robotics, and Medical Imaging (ISRACAS 2002)
May 23, 2002
Tel-Aviv, ISRAEL
Email: josko@cs.huji.ac.il
http://www.cs.huji.ac.il/~josko/isracas2002.html

7th Symposium on the 3D Analysis of Human Movement. 10th-12th July. The Meeting will be held at the Centre for Life in Newcastle.
email: g.r.johnson@ncl.ac.uk
http://www.ncl.ac.uk/crest

Ergonomics Society Annual Conference 2002
Homerton College, Cambridge, UK
Call For Papers. Closing date for receipt of submissions is 24th August 2001. Contact c.greenwood@ergonomics.org.uk or http://www.ergonomics.org.uk

3rd International Workshop on Musculoskeletal and Neuronal Interactions,
Corfu, Greece, 24-27 May. Contact: M.Katsiri, PO Box 51 081, 145 10 Kifissia, Greece. Tel: 30.1.6280659, Fax: 30.1.8085462, Email:info@ismni.org, www.ismni.org.

13th Conference of the European Society of Biomechanics.
Wroclaw University of Technology.
1 -4 September 2002
http://www.esb2002.pwr.wroc.pl

International Congress on Biological and Medical Engineering (incorporating 5th Asia-Pacific Conference on Medical & Biological Engineering and 11th International Conference on Biomedical Engineering).
4th - 7th December 2002
Raffles City Convention, Singapore
http://www.icbme.org

A Note from the Treasurer -

Enlcosed with this Newsletter is your invoice for next year's membership dues and (optional) journal subs. Journal prices have risen in real terms, but the rise in membership fees only reflects a lower exchange rate between the Australian and US dollars. Please also take the time to correct any errors or omissions in your mailing address and/or contact details. This information is now automatically listed on our Web Site, but can be omitted if you wish.

Editor's Notes and Requests:

1. Usually the Newsletter is published in the spring, summer, fall and winter, although if you are in the Southern Hemisphere, this may be different. There are no deadlines for newsletter material since historically they have never been taken seriously. The content of the Newsletter does not necessarily reflect the philosophy and opinions of the ISB membership.
2. Newsletter items such as Opinions, Affiliate Society News, Thesis Abstracts, Reviews of Biomechanics Meetings are desirable and may be considered for publication. Material may be submitted electronically or on a computer disk as a text-only file, and must be in some form of English. In keeping with the tradition set by the former editor, Mark Grabiner: "Hard copy submissions of anything are acknowledged telepathically and placed in a recycling bin. Submission is not a guarantee of a timely or accurate appearance in the Newsletter."
3. In the previous newsletter I mentioned that I had been asked to include a "Laboratory Feature" in this newsletter. **However, nobody volunteered to write a description of their lab!** Thus the invitation is still there for anyone who is willing to send me a description of their lab's unique qualities!
4. Here is another invitation—have you collected data that initially made no sense, but then led to an interesting conclusion after you accounted for an additional variable or an experimental "quirk"? Perhaps you did a study on bone properties and found bone strength to be inversely proportional to bone mineral content — and then found an explanation for this unusual outcome. **If you have any story along these lines, please submit it to me**—we can publish the conundrum and then place the answer towards the back of the newsletter.

Heard it through the grapevine:

From "Yahoo News"
http://dailynews.yahoo.com/h/nm/20011112/sc/health_legs_dc_1.html

``Leg length is inversely associated with the risk of coronary heart disease and with components of the insulin resistance syndrome among adults," said Professor George Smith, of the University of Bristol in southwest England. Insulin resistance syndrome is a precursor to diabetes.

Smith, whose study involved 2,512 men in Wales who were monitored for 15 years, believes the link between leg length and disease risk supports the theory that poor nutrition and genetic factors contribute to heart disease and diabetes.
Smith and his colleagues said the men with short legs in the study had higher blood fat levels as well as large amounts of a blood clotting factor. Men with shorter legs also had more heart attacks than their taller counterparts.

From "Diet and Health: Ten Megatrends" Nutrition Action Newsletter, Jan/Feb 2001.
In the 1950's and 1960's, McDonalds offered a burger, french fries and a Coke with a total calorie count of 590. Today a quarter pounder with cheese, Super size fries and a Super Size Coke accounts for 1,550 calories.
Nowadays children as young as 10 are being diagnosed with type 2 diabetes.

From "Designfax", Sept 2001 (Nelson Publishing Inc., www.designfax.net)
Embedded Magnetic Domain technology can be used for direct measurements of the torque on rotating shafts. The "technology applies a small zone of the shaft with specific magnetic patterns, then measures the field alterations generated through the twisting of the shaft", even at speeds as high as 100,000rpm!

From HMS Beagle Issue 110, Sept 14th, 2001.
(http://news.bmn.com/hmsbeagle/110)
Elephant seals, whose ribcages are flexible and can bend to accommodate high pressure, collapse and reinflate their lungs about sixty times a day when they are foraging at sea. Once the animal descends to 30 or 40 meters below the surface, pressure has wrung all oxygen out of the lungs, and the seal's body, no longer buoyant, begins to sink like a stone. This saves on both energy and oxygen, which the seal can then invest in swimming as it goes after squid or bottom fish at great depth.

Pfizer/IOC Olympic Research on Sport Sciences

Sydney 2000 Olympic Games

The research partnership between Pfizer and the IOC Medical Commission has two major purposes:

- to protect the athletes from excessive forces (i.e. injury reduction and prevention) and
- to enhance performance naturally by using improved understanding of the functioning of the athlete's body.

Olympic Research Projects were planned, organized and executed in a collaborative effort between selected research teams, the IOC Medical Commission and the corresponding International Federation.

The research projects for the Olympic Games in Sydney were selected through a thorough scientific selection procedure. In total 43 project proposals were submitted by scientists from 15 countries. Nine project proposals were accepted, seven for projects during the Olympic Games and two for projects related to the Olympic Games with data collection before the Games.

(1) Morphological correlates of equipment set-up and performance among Olympic kayak paddlers, canoeists and rowers (Dr. Tim Ackland, University of Western Australia, Australia).

Kinanthropometric measures were taken from participating Olympic athletes in rowing, canoeing and kayaking, prior to the start of the Olympic Games, to study the relationship between body measures and performance.

Results:

Body size, proportion and composition are critical factors in these sports. Ideal paddlers have high upper body strength, big chests and wide, large shoulders long forearms (78-80% of their upper arm length). Ideal rowers should be tall and heavy, with the exception of the lightweight rowing division in which it's still ideal to be tall, but obviously not heavy. The findings from this study can be useful in talent identification at the junior levels and among countries new to these Olympic sports.

(2) Monitoring and evaluation of training and performance of Canadian Olympic swimmers (Dr. David Smith, University of Calgary, Canada).

The purpose of this project was to understand and quantify the potential factors responsible for appropriate preparation of high performance swimmers.

Results:

Key factors in an athlete's final performance are based on:

- Biomechanics (technique)
- Tactics (go out fast or slow)
- Physiology (fitness, muscle, cardio)

The key finding was that analyzing all aspects of an individual swimmer's training (e.g., stroke length, stroke rate, speed of turns, heart rate response, muscle mass/strength, lactic acid produced, intensity of workout, mileage at various intensities, etc.), over an extended period of time (e.g. 15 weeks), allowed for an accurate prediction of the (best obtainable time) final performance. The results of this study showed that individual data of one particular athlete's training can reveal much more about that athlete's final performance than the mean data of several athletes. Thus, split times of different swimmers during training shouldn't be compared to gauge athlete's progress.

(3) Factors contributing to gymnastics landing performance during Olympic competition (Dr. Jill McNitt-Gray, University of Southern California, USA)

The purposes of this project were (a) to identify factors related to landing performance and (b) to determine factors responsible for high landing forces in gymnastics.

Results:

Accurately anticipating the mechanical demand imposed during landing is critical for safe and effective interaction between the athlete and the landing surface. Currently, landing success among gymnasts is only about 50%. Data was used to create a model whereby researchers could experiment with performance changes to determine how and if the landing would change. The dynamic model can help to determine and simulate how the individual could modify their flight phase control and dynamics so that the individual is able to successfully "stick" the landing. Modeling and simulation techniques have also shown that flight phase control strategies may be used to improve the ability of the gymnast to control momentum during landing.

(4) Release mechanics for high bar dismounts (Dr. Fred Yeadon, Loughborough Univ. UK)

The purposes of this project were to identify factors (a) related to performance and (b) responsible for high forces during high bar (male) and uneven bar (female) performances. Gymnasts were filmed to study release and re-grasp techniques.

Results:

The advantage of the scooped backward giant circle technique is related to the margin for error when releasing the bar. That is, using a scooped accelerated giant circle leads to an increased margin for error when releasing the bar compared with the traditional technique. The margin for error may be quantified in terms of the time over which the gymnast has the correct linear and angular momentum. If the gymnast releases at any point during this "release window" he will have sufficient flight and rotation (angular momentum) to complete the dismount. It follows that the greater the release window the larger the margin for error for gymnasts in releasing the bar.

(5) Tennis serve biomechanics with implications to shoulder and elbow injury (Dr. Glenn Fleisig, Am. Sports Medicine Institute, USA).

The purpose of this project was to determine serve mechanics and joint forces of elite tennis players and relate the results to possible injury.

Results:

The two most crucial injury moments in the tennis serve are when the arm is cocked back and the moment the racquet makes contact with the ball. The moment of truth in the tennis serve for both performance and injury is when the arm is cocked back for the serve. These elite players actually cock their arms back to 170°, which is an extreme position.

(6) Competition swimming analysis at the Sydney Olympic Games (Dr. Bruce Mason, Australian Institute of Sport, Australia).

This project had both service and research components. The service component consisted of providing information on stroke rate, stroke length, velocity and efficiency of free swimming as well as start, turn and finish times of swimmers in each race. The research consisted of statistical analysis of the data with respect to identification of performance indicators.

Results:

Swimming studies led to these observations:

- A high correlation between maximizing stroke length and the ability to swim fast does not exist
- In backstroke, breaststroke and butterfly races, those who stayed under water longer and for a further distance had a better turn performance.
- In backstroke, breaststroke and butterfly races those who stayed under water longer and for a further distance during the start phase had better start performances.
- The efficiency index used by many coaches to evaluate free swimming performance is not a good indicator to discriminate between the technique of the different swimmers.

(7) Kinematics and kinetics in pole-vaulting: Energy storage and energy return (Dr. Peter Brüggemann, German Sports University, Cologne, Germany, P. V. Komi, University of Jyväskylä, Finland).

The purpose of this project was to improve vaulting technique, while at the same time reducing the potential for lower back injuries.

Results:

Two techniques are used in Pole Vaulting. In Technique 1, the pole hits the ground while both of the athlete's feet are still on the ground. In Technique 2, the grip on the pole is slightly higher and the athlete's feet are just off the ground when the pole hits the surface for the first time. The difference between the two techniques is only 50 milliseconds. Technique 1 puts more stress on the spine and does not maximize the jump height potential. Technique 2 is not only safer on the spine, but it allows for higher jumps.

(8) Energy produced and lost on sprinting performance (Dr. Darren Stefanyshyn, University of Calgary, Canada).

The purpose of this project was to determine the influence of shoe sole stiffness on running performance.

Results:

Research findings suggest that the stiffer the sole of the shoe, the less energy is lost from the bending of the foot. The energy saved can amount to a time difference between winning a medal or not, especially in shorter distances.

General Comment

Compared to previous biomechanics studies undertaken at the Olympic Games, the selected projects for the Sydney Games had a new aspect. For three of the nine projects chosen, the Olympic data collection was just one component of a larger project. This combination of laboratory and field data allows for a better study design and relevant findings are, hopefully, more likely. Future Olympic projects are encouraged to move in this direction. Further information available at www.olympic.org.

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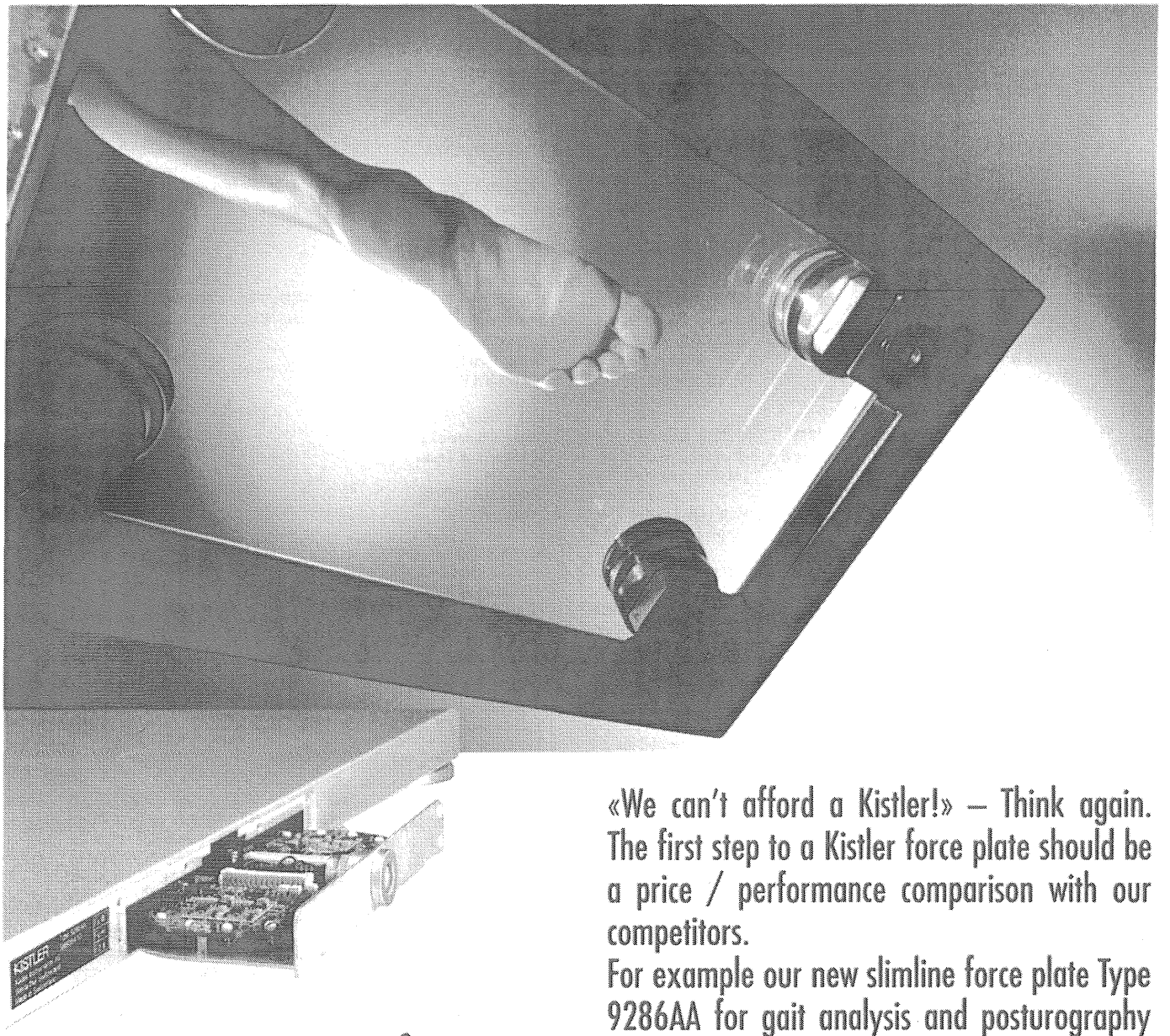
The Original – now at strain gage prices



«We can't afford a Kistler!» – Think again. The first step to a Kistler force plate should be a price / performance comparison with our competitors.
For example our new slimline force plate Type 9286AA for gait analysis and posturography has become 30 % cheaper after building the miniaturized charge amplifier right into it. Contact us for more information.

Price reduction due to built-in electronics

KISTLER

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