International Society of Biomechanics Newsletter

Spring 1983, n°10.

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Membership of ISB

SUGGESTIONS FOR MAILING 1983 ISB DUES

The dues notices for 1983 will be mailed about February 1st. Last year many members paid their dues by bank checks which were written in dollars but drawn on a bank in a country other than the United States. When these checks are cashed the ISB must pay a fee to the State College Bank, to an intermediary bank and finally to the bank on which the check is drawn. These fees sometimes amount to S10. to S12. U.S. on a S.15.00 U.S. check. If your bank does not have a branch in the United States, it is suggested that dues be forwarded by International Postal Money Order in dollars. This will be less expensive for the ISB and probably also for the member. Thank you for the cooperation.

C.A. MOREHOUSE,
Treasurer.

Executive Notes

MINUTES OF THE ISB EXECUTIVE COUNCIL MEETING

Amsterdam, Holland, June 19-20, 1982.

Present : W. Baumann
J.P. Clarys
B. Jonsson
P. Komi
M. Miyashita
C. Morehouse
B. Nigg
J. Paul
D. Winter

President's report (Komi)

The president reported on his activities during the past year. An important part of his work has been to organize the work within the Council and to delegate different duties to Council members.

Treasurer's report (Morehouse)

The treasurer gave a brief financial report. There has been some problems concerned with not having the computer updated with respect to membership fees. Some members have been asked to pay fees which they already have paid. Those members who have paid their 1982 fee have received a membership card.

Approval of new members

Some new members were reported by the treasurer and were approved by the Council :
- Hoerner, Earl F. (U.S.A.)
- Janko, Hancevic (Yugoslavia)
- Kedzior, Krzysztof (Poland)
- Manning, James (U.S.A.)
- Nelson, Roger M. (U.S.A.)
- Robertson, Gordon (Canada)
- Smith, Robert T. (Canada)
- Toshev, Yuli (Bulgaria)
- Vasilije, Nikolic (Yugoslavia)
- Vukicevic, Slobodan (Yugoslavia)

Change of constitution regarding membership

The treasurer suggested a constitutional change with the meaning that a person shall automatically become a member of ISB as soon as he/she applies for membership and pays the dues. There should not be any need to get the nomination supported by two members "in good standing". This change should be suggested in the next Newsletter. The decision has to be made by mail balloting. The final decision should be made in Waterloo at the general assembly meeting. A working group (Morehouse, Nelsen, Hay and Clarys) was estbalished to prepare the question.

Selling copies of the membership list

It was decided that it should be possible for the treasurer to sell labels with addresses of the members. In each case the decision should be made by the officers (president, secretary and treasurer). For professional groups (other societies, etc.) the cost should be the ral cost for producing the labels. For commercial groups the cost should for the moment be 10 cents per label.

Printing of Biomechanics VIII

Miyashita discussed the printing of the last issue of Biomechanics.

Exchange of information outside ISB

A committee consisting of Morehouse, Paul, Nigg, Hay and Komi was formed with the aim to prepare the procedure for exchange of information with other groups outside ISB.

Future conference philosophy within ISB (Nigg)

A committee should develop guidelines for congress organization. It was decided that this committee will consist of Winter (chairman), Baumann, Clarys and Jonsson. The report from the committee shall be presented to the Council during the Waterloo meeting.

IX Internationa Congress of Biomechanics

Winter informed about the progress of the planning of the next ISB Congress in Waterloo, Canada. The ISB Council Meeting is suggested to take place on the Saturday preceding the congress.

Changes in the process of accepting papers.

The following guidelines were discussed :

- No mor than 2 oral or poster presentations should be allowed for each participant.
- All presentations will undergo the same review process.
- A two page summary is to be submitted for review purposes.
- The council should develop guidelines for acceptance of papers.

Policy of no-shows

The following guidelines were discussed and accepted :

1. Failure of a speaker to be present at the congress for the delivery of a paper may prejudice the acceptance of papers submitted for the next congress.
2. There will be no printing of the paper if the speaker does not show up no matter what the reason is.
3. Notification of participation must be given by the speaker at least 30 days before the congress, otherwise the paper will be automatically rejected.
4. The final program ought not to be printed before 14 days ahead of the congress.
5. The person who presents the paper must be familiar with detailed scientific content of the paper and must be able to answer questions related to the presentation.

International Society of Biomechanics of Sports

The recently formed ISBS was discussed. It was decided that a note should be sent to Juris Terauds from ISB where it is clearly stated that ISB is seriously conserned about the development.

Subcommittee on Biomechanics of Sports

It was decided to form a Subcommittee on Biomechanics of Sports within the ISB and in affiliation with the ICSPE. Simultaneously the working group of Biomechanics of Swimming was terminated. The new subcommittee will coordinate all the sports related conferences between the major congresses of ISB. Marcel Hebbelinck (ICSPE research committee), Léon Lewillie (working group of biomechanics of swimming) and Günter Rau (former vice president of ISB) were present when this item was discussed and they agreed with the decision.

Satellite Meetings

Satellite Meetings to the International Congresses of Biomechanics have to be accepted by the officers of ISB after recommendation from the congress organizer.

10th International Congress of ISB in 1985

The 10th International Congress of ISB in 1985 was discussed. There is still no official applications for the arranging of the congress.

Proceedings and newsletter policy

The following guidelines were discussed :

- It is the responsibility of the congress organizers to appoint editors and reviewers. The scientific committee is responsible for the preparation of the proceedings. The financial arrangement is a responsibility of the organizing committee.
- Advertisement in the Newsletters should be possible. The redactor has to state the price for advertisement.
- There will be proceedings from the IXth Congress of ISB in Waterloo. Nelson and Morehouse will continue assisting with the revision of the proceedings and with the negotiations with printers.
- It was decided that the present form of proceedings from the congresses should continue and that the society should not continue negotiating about an ISB journal (intended for publication of the congress proceedings).

Balance representation

A suggestion from Miyashita was accepted. A summary of the suggestion has to be prepared and shall be printed in the ISB Newsletter.

Dispersion of the duties within the council

A suggestion from Nelson was accepted with slight modifications. The instructions for the secreatry general and for the treasurer will be worked out later and decided during the Waterloo meeting.

Bengt Jonsson
Secretary General.

Important Notice

To whom it may concern,

Some time ago, Keith Hayes started the idea of a series of laboratory feature. As new editor of the Newsletter, I feel this initiative should be continued and therefore I ask the members of the ISB to send me a report and description of their laboratory. Keith had a good feedback on these reports and I am hoping the same.

In order to help you in making such a report, we have made a feature which is easy to follow and standardizes the layout of such reports. May I invite you all to make such a report for your Newsletter.

Jan Pieter Clarys.

ISB Newsletter Feature on Laboratories

Name of Laboratory :

Institution :

Mailing Address :

Telephone number :

Purpose and Objectives of Laboratory :

Principal Personnel (include names, qualifications, rank within organizational structure and research interests)

Technical Support Staff (include names, qualifications and areas of expertise) :

Student Population (include past and present - either in a general way or with specific names) :

Organizational and Funding Structure (e.g. is the laboratory of Federally funded operation, part of a university of funded by industry) :

Historical Development (if noteworthy):

Titles and Sources of Funding for External Grants and Contracts :

Description of Facilities (give brief overview of available facilities and describe in more detail any particularly unique data acquisition system or signal processing capabilities) :

Current and Past Projects :

Bibliography and Published Work :

Conferences of Workshops Hosted or Planned :

Other Information :

Black and White Photographs Enclosed : (either laboratory personnel or facilities)

Yes _____ No ____

Captation for Photographs :

PRESS RELEASE

The U.S. National Committee on Biomechanics has been established to encourage research in all branches of biomechanics and to speak on behalf of the U.S. biomechanics research community.

Discussions about the formation of the USNCB took place over the past three years. Professor Y.C. Fung, its Honorary Chairman, recognized the need for such an organization, and has been a major force in its establishment. The Committee was formally inaugurated on April 21, 1982 in New Orleans. It consists of representatives from over twenty scientific and engineering professional societies with interests in biomechanics research.

Biomechanics concerns the application of the laws of mechanics to problems that arise in living organisms. This scientific discipline has been almost-explosive growth over the last ten years. The many contributions already made by biomechanics research to health care have been a major factor in this growth. Many other contributions will undoubtedly be made in the future ; to health care in particular, and to scientific research in general.

The USNCB will provide an organization to whom research funding agencies and scientific councils can turn to advance biomechanics research. It will also assist in the convening of international meetings on biomechanics, and it will promote cooperation among member societies in biomechanics research activities.

For further information, please contact A.B. SCHULTZ (Chairman), University of Illinois, Box 4348, Chicago, IL 60680 (312-996-8514).

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Important Notice

The galley proofs for *Biomechanics VIIIA* and *VIIIB* have been sent to the authors. The publisher will begin to make up pages about February 1st and expects that the book will be published between April 1 and 15, 1983. Members who registered at the Nagoya Congress should receive their copies sometime in May or June depending on the mail service. Copies of *Biomechanics VIIIA* and *VIIIB* may be ordered directly from Human Kinetics Publishers, Inc., P.O. Box 5076, Champaign, Illinois 61820, USA. The estimated cost of the set of two volumes is $80.00 US. per set, $40.00 US. per volume.

INSTRUCTIONS TO AUTHORS

In order to facilitate the editing of the ISB Newsletter, we would appreciate receiving any material according to the following criteria :

1° All material should be typewritten single spaced.

2° Typewrite within a frame of 10 cm width.

3° The title should be written in CAPITAL LETTERS.

4° Subtitles should be written *in italics* and/or underlined.

5° Different paragraphs should be separated by double spacing.

6° Try to use the whole text-face. There should not be any margines inside the frame.

Tank you in advance for your cooperation.

Jan P. CLARYS
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P.S. The ISB Newsletter is published quarterly. Material and articles should reach us prior to February 10 for the Spring issue, May 10 for the Summer issue, August 10 for the Autumn issue and November 10 for the Winter issue.

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SPECIAL ARTICLE

BIOMECHANICS OF SPORT -
- EXPLORING OR EXPLAINING?

by

James G. HAY
Department of Physical Education,
University of Iowa, Iowa City, Iowa.

This paper (part II) was presented on the Australian Sports Biomechanics Lecture Tour (July 29 - August 12, '81). At the direction of the Tour Organizer (Dr. Graeme Wood) the paper was prepared for presentation to "a large public audience made up of a broad cross-section of the community". Part I of this paper was published in the "Winter" Newsletter.

Part II.

CONTRIBUTIONS TO PRACTICE

One of the ultimate goals of sport biomechanics is to improve practices in physical education and sport. Such a statement raises the obvious questions "To what extent is sport biomechanics realizing this goal?", "How has sport biomechanics influenced practices in physical education and sport?". Such questions are a great deal easier to ask than to answer. There is little solid evidence upon which to base an answer and what evidence there might be is often not available to us for commercial and political reasons. We are obliged, therefore, to rely on our own observations and the reports of others if we are to obtain even a crude indication of the impact that sport biomechanics has had on practice.

My own assessment of the situation goes seomething like this. I believe, that sport biomechanics has had an impact in two distinct ways. First, it has made some of the students in the biomechanics courses in our schools and departments of physical education better teachers of skills than they would otherwise have been. Second, it has, on occasion, provided teachers, coaches and athletes with improved equipment or techniques with which to perform.

Almost all students of physical education throughout the world are now required to take one or more courses in biomechanics or kinesiology -- a term preferred by some who don't know its checkered past! The content of some of

these courses is highly relevant to the practical teaching and coaching situations to which the bulk of the students go. In these cases, some of the students master the basic concepts sufficiently well that they are able to make the conceptualleap from the theory of the textbook to the practices of the playing field. It is through these students, I believe, that sport biomechanics has an influence on practice.

Although the contributions that sport biomechanics has made to practice in the form of new equipment and new techniques are occasionally acclaimed in the mass media and frequently extolled in sporting goods catalogues, it is very difficult to obtain conclusive evidence of their impact. It is even difficult to ascertain in many cases whether a new development is the result of rigorous biomechanical research or inspired tinkering. Consider, for example, some of the changes that have taken place in recent years in the equipment used by downhill skiers. Holes have been cut in the toes of the skis; the baskets on the skipoles have been replaced by spheres ; and the poles themselves have been bent so that they wrap around the skier's body when he is in the characteristic egg position of the downhill racer. What effect each of these developments in equipment have had on performances and what credit sport biomechanics might reasonable claim for them is not public knowledge.

While there are many simular examples that could be cited, there are also some cases where the magnitude of the improvement and the contributions made by sports biomechanics are widely-proclaimed. However, such claims are usually inflated or distorted to improve the sales of the product being extolled and are thus virtually as a measure of the impact that sport biomechanics has had on practice.

Problems also exist in evaluating the effect that biomechanics research has had on the teaching and coaching of techniques. Since it is virtually impossible to determine precisely what effect a research-inspired change in technique has on a performance -- the effect of training, motivation and other factors invariably cloud the issue -- one is obliged to rely once again on personal observation and the anecdotal reports of others. Such observations and reports are necessarily subjective, probably biassed and possibly even self serving. However, despite all these obvious and serious limitations they are the only source of information we have on the subject. And what do they indicate? As I see it, they indicate that sport biomechanics has had a noticeable impact on the teaching of techniques in physical education and sports. There are many examples that could be cited in support of this conclusion. I intend to cite three from my own experience as an athlete, coach and researcher.

In 1940, as part of his masters program at Springfield College, Richard Ganslen conducted a comprehensive cinematographic analysis of the techniques used in the pole vault. Several years later he published the major findings from this study, together with a collection of other materials on the event in a book entitled Mechanics on the Pole Vault[6]. This book, became a standard reference work for pole vaulters and their coaches. For more than two generations it has been carried in the bags of vaulters around the world along with their running shoes, athletic tape and other essential tools of the vaulter's trade. It has, without question, exerted a major influence on practices in the event.

In the early 1950's Franklin Henry and his co-workers[8,9,10] conducted a series of studies on sprint starting. On the basis of these studies, they concluded that a medium start with the feet 40cm apart yielded better results than did starts with the feet closer together or further apart. They also concluded that 90 percent of top speed was attained in the first 14 meters and top speed after 6 seconds -- or about 45-55 meters, depending on the ability of the runner. I know from my own experiences as a track coach in New Zealand, that these results exerted a considerable influence on the teaching and coaching of sprint starting in that country. They were the basis for recommending, via instructional manuals and coaching clinics, that the medium start be taught in schools and clubs ; for decisions about the distances over which practice starts should be run in training ; and for decisions about the optimum length of the approach in the long and triple jumps. I suspect that they had a similarly important influence on teachers, coaches and athletes in many other countries.

In 1970, James Counsilman and Ronald Brown[2,3] published the results of a study which I believe has had a more profound influence on the teaching and coaching of sport skills than any other I know. On the basis of some very simple observations of the paths followed by the hands of top-class swimmers, they concluded that the propulsion a swimmer obtained from the actions of his arms came more from lift forces produced when the hands move sideways than from drag forces generated when they moved backwards. (The somewhat tentative conclusion of Counsilman and Brown

has since been strongly supported by the findings of Robert Schleihauf[15,16,17] and other researchers[19]. This conclusion was in direct conflict with established practices in swimming. For decades, teachers and coaches had been urging their swimmers to move their hands backward in a straight line in the believe that it was this backward motion, generating a propulsive drag force, that drove the body forward through the water. The findings of Counsilman and Brown -- and the supporting evidence of Schleihauf and others -- have changed all that. Now teachers and coaches all over the world are emphasising the lateral motions of the hands. They are also keenly aware that the pitch of the hands -- hitherto considered of little consequence -- is actually of critical importance in determining the propulsive forces generated by the hands.

In summary, it's my belief that biomechanics has had a much greater influence on practices in physical education than is generally recognized or aknowledged.

Having done my best to convince you that biomechanics does have much to offer, I would like now to draw your attention to two areas in which biomechanics actually has less to offer than is often supposed.

Teachers, coaches and athletes are frequently faced making a choice between two techniques designed to archieve the same goal -- a choice between the flop and the straddle in the high jump ; between the circular arm-swing and grab starts in swimming ; between the orthodox and Russian technique for a front somersault in gymnastics ; and so on. The choice in any given case would be greatly simplified if it could be demonstrated that one of the techniques was inherently superior to the other and numerous studies have been conducted for just this purpose.

The usual procedure in these studies is to take a group of subjects who have been trained in the orthodox technique, give them some training in the new, alternative technique and then record their performances when they use each in turn. A statistical analysis is then conducted to determine if either technique yielded significantly better results than other.

There are two major problems with this procedure -- the practice times devoted to the two techniques are not equal, and no account is taken of differences in the complexity of the techniques and, thus, in the times required to obtain comparable mastery of them. In short, the procedure is biassed in favour of the orthodox technique on the first count -- because the subject has had more practice in the use of that technique -- and in favour of the less complex technique on the second count.

To demonstrate what effect biases can have, consider an experiment in which a number of straddle-style high jumpers are taught the flop-style and trained in its use for some weeks. There are only three possible results that can be obtained when their performances with the two styles are compared :

1. The straddle is significantly better than the flop.
2. There is no significant difference between the two.
3. The flop is significantly better than the straddle.

Let us suppose that the straddle was found to be significantly better than the flop. This findings could be interpreted to mean that :

(a) The straddle is significantly better than the flop.
(b) There is no significant difference between the two, but differences in the amount of practice time devoted to each biassed the result in favour of the straddle.
(c) The flop is significantly better than the straddle, but differences in the amount of practice time devoted to each biassed the result in favour of the straddle.

In short, the researcher knows no more at the end of the study than he did at the beginning -- that is, the two techniques are either equally effective or one is better than the other. A similar situation exists if either of the other two results are obtained.

Given these circumstances, it is obvious that studies with an experimental design like the one described here serve little useful purpose. They certainly do not answer the question as to which is the superior technique -- except, perhaps, under the most unlikely circumstance that a less-practiced and more complex technique yields significantly better results than the other technique considered. This, of course, leaves the basic question unanswered, and it will remain unanswered until a rigorous, scientific procedure is developed to enable us to evaluate the relative merits of different techniques. We urgently need such a procedure.

I am presently involved as a consultant in a multi-million dollar product-liability suit. This suit stems from an accident in which a gymnast failed to complete a difficult tumbling movement, landed on his head and broke his neck.

He is now a quadriplegic with little or no voluntary movement below shoulder level. Lawyers for the two sides in this case have retained a number of consultants to work on various aspects of it. Among these are two engineers with extensive backgrounds in biomechanics. These two -- one on each side -- have used similar approaches to determine whether the mat on which the gymnast landed was responsible for the injury that he sustained. This approach consisted of dropping an instrumented dummy (like the ones that are used in car-crash research) or an instrumented block in the shape of a human head and noting the accelerations it experiences when it lands on the mat. This information was then used with a mathematical model -- a series of equations used to describe how a real body would behave under the same circumstances -- to determine whether the forces transmitted to the neck would be sufficient to produce the injury sustained by the gymnast. The results obtained were in total disagreement -- one of the engineers concluded that the mat was clearly the cause of the severe injury sustained by the gymnast while the other concluded that the mat could not possibly have been responsible.

Several conclusions might be drawn from all of this. One of them is that mathematical modelling -- the process of representing human motions by equations which are then manipulated to see what happens under various conditions -- is, as yet, an inexact science.

This inexactness stems from two major sources. First, because the human body is an extremely complex mechanical system, it is necessary to make a number of simplifying assumptions before it can be modelled at all. For example, in some cases, it is assumed that the body behaves in the same way as a particle which has the same mass as the body. In others, it is assumed that the body moves as if it is made up of a series of rigid links pinned together at the joints. These assumptions -- and the scores of others that are used in mathematical modelling -- introduce errors. These errors may be trivial, or they may be so large as to totally invalidate the results obtained when the model is used.

Second, there are many important characteristics of the body that are unknown and perhaps unknownable. For example -- and for obvious reasons -- we do not know how much force must be exerted in various directions to break the neck (or sever the spinal cord) of a gymnast. We can only make estimates -- and probably very crude estimates -- based on experiments with cadavers or, possibly, with experimental animals. Error introduced by faulty estimates of the characteristics of the body may also invalidate the results obtained when a model is used.

We hope that researchers in biomechanics will eventually overcome these major problems in the use of the mathematical models or, at least, minimize their adverse effects on the accuracy of the results obtained. In the meantime, however, we would all be wise to view mathematical modelling studies with caution. Certainly we should not accept the extravagant claims -- occasionally made on television and in the popular press -- that, through modelling, sport biomechanists can now determine routinely the optimum technique for a given athlete. Except in a few isolated cases, these claims are totally without foundation.

CONCLUSION

The biomechanics of sport is a vast field encompassing, or impinging upon, several sciences, many technologies and the entire range of movement techniques used in physical education and sport. There is much that this field can offer. It can explain what is already known in practice and, in so doing, provide a scientific basis for such things as the selection of equipment, the teaching of techniques and the prevention of injuries. It can also explore the unknown. It can seek answers to fundamental questions concerning how the body moves and, especially important since most of us in physical education and sports are concerned with improving performance, how the body can be moved to best effect. Indeed, the title of this talk might well have been "Biomechanics of Sport -- Exploring and Explaining" for the field is vitally concerned with both.

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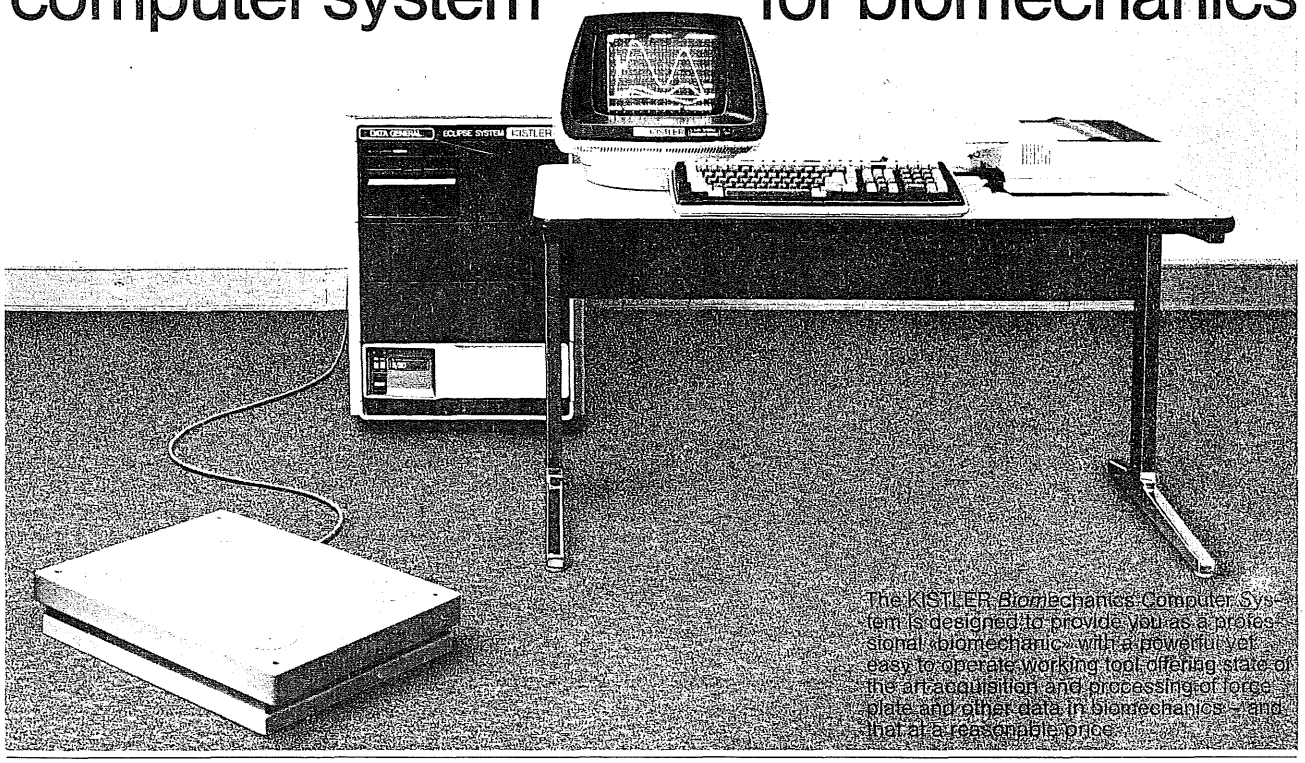

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BiomeCoS is based on the ECLIPSE S/20, the newest generation of scientific 16 bit microcomputers from Data General Corp. It is one of the fastest, most advanced and cost efficient systems available today. The 128 kilobyte memory is expandable to 2 Megabytes, the 5 Megabyte hard disk can be extended to 15 or 50 Megabytes. The floppy disk has 1,2 Megabytes, and a cartridge tape drive is available, too. Professional service for the hardware is assured by Data General's worldwide service organization. The remote controlled charge amplifiers are directly mounted in the computer housing. The KISTLER developed software is optimized in Assembler language and will continuously be upgraded.

BiomeCoS can keep pace with your future needs

The system can normally be fitted with one or two 8-channel charge amplifier units and can be used with one or several force plates. Additional data such as EMG, video data, synchronization signals and so on may be fed into the system which in turn can produce digital and analog outputs for various purposes. BiomeCoS is usually powerful enough to serve as the main computer. If need be it can readily communicate with larger units. An IEEE interface is also available as an option. The user may write his own additional programs in FORTRAN V, PASCAL or BASIC. An optional superfast hardware floating point processor may then be useful.

Over 400 KISTLER force plates are used by leading institutions in 30 countries around the world.

Please ask for detailed information.

Systems will be shown at:
IX ISB Congress Waterloo, August 1983

Piezo-Instrumentation

KISTLER

Kistler Instrumente AG
Eulachstrasse 22
CH-8408 Winterthur, Switzerland
Tel (052) 83 11 11, Tx 76458, Fax (052) 25 72 00

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Congress Announcement

IXth Congress of the International Society of Biomechanics

Conference Chairman
D.A. Winter

Vice-Chairman
K.C. Hayes
R.W. Norman
R.P. Wells

Conference Secretary
Ms. J. Karger
Department of Kinesiology
University of Waterloo
Waterloo, Ontario, Canada
N2L 3G1
(519) 885-1211, Ext. 2156

Call for Papers.

The aim of the Congress is to report research in the area of biomechanics of human movement: athletic and recreational, normal activity including the work place, and pathological movement.

Specific topics include:

- Biomechanical assessment of athletic performance
- Assessment of protective and functional sporting equipment
- Biomechanical assessments of pathological movement
- Assessment of orthopaedic, prosthetic and rehabilitation devices
- Biomechanical assessments of the work place and occupational movements
- Measurement techniques and equipment
- Computer simulation, synthesis, modelling
- Biofeedback
- Neuromuscular control
- Clinical and kinesiological electromyography
- Biomechanics of muscles and joints
- Tissue biomechanics

Your scientific committee is planning specially sponsored seminar and workshop sessions on the following:

- Assessment of Normal and Pathological Gait
- Biomechanics of the Spine
- Biomechanics of Joints & Ligaments: Normal & Pathological
- Occupational Biomechanics
- Safety Assessment of Sports Equipment

Instructions to Authors

The official language of all written and oral presentations is English.

Papers are to represent new findings and techniques and must not have been reported or should not be in the process of being reported elsewhere. In order that we have representative research from the scientific community any author is limited to two papers as first author, but may be co-author on other papers. All presentations, whether oral communication or poster presentations, will undergo the same review proces and are subject to the same deadlines. Poster presentations will be given at special times, not concurrently with oral communications, workshops or keynote talks.

A **two page** summary, including figures, is to be submitted for review purposes. The summary is to include key references, equations, figures and should demonstrate the research findings and their significance. Figures used in this two page summary need not be final "camera-ready" copy but must be clearly labelled and technically correct. Selection of the papers will be based on **relevance** to biomechanics of human movement and the **quality** of the content. A **150 word abstract** is to accompany the two page summary and if the paper is accepted the abstract will be published in the Congress program. Use Form A when submitting a paper.

Deadlines for Authors

- Receipt of 2 page Summary and Abstract – March 1, 1983
- Notification of Acceptance or Rejection – May 1, 1983
- Receipt of Author's Registration Fee – July 1, 1983

Inclusion of papers in final program is conditional on receipt of registration fee from the **author who will be presenting** the paper. The final program will go to press on July 8, 1983.

Registration Fees

Full Registration

Includes attendance at all sessions, copy of Biomechanics IX, reception, outdoor barbeque and banquet. Tours are extra.

Early (received before March 1, 1983)$210.00 CDN. or $180.00 U.S.

Regular (received after March 1, 1983) $230.00 CDN. or $195.00 U.S.

Student Registration

For those who are still a registered student in a university program as of July 1, 1983. Registration fee includes the same events covered by a Full Registration.

Early (received before March 1, 1983) $115.00 CDN. or $95.00 U.S.

Regular (received after March 1, 1983) $125.00 CDN. or $105.00 U.S.

Accompanying Persons Registration

Program includes opening reception, outdoor barbeque and banquet. Tours are extra.

Regular $70.00 CDN. or $60.00 U.S.

For Registration See Form B, ISB members please note the $10.00 discount on above fees.

Cancellation Policy

Those cancelling before July 1, 1983 will receive 75% of registration and accommodation fees. Cancellations received after July 1, 1983 will receive a 50% refund.

Final Manuscript

For those papers that are accepted for presentation a final manuscript with camera-ready figures will be required prior to the Congress. Authors will be alerted of any editorial changes at the time of the Congress. Manuscripts are to be typed, single spaced on special camera-ready forms which will be sent to all presenting authors when they are notified of acceptance. The total length of the manuscript is not to exceed 6 pages including references and figures. Each page is approximately 600 words. Detailed instructions will accompany the acceptance notice.

A special committee will select those papers to be published in Biomechanics IX. Papers not actually presented at the Congres will not be considered for publication.

Deadline for receipt of full manuscript for publication in Biomechanics IX: – July 15, 1983.

New Investigator's Awards

Two special awards of $500.00 each have been donated. An international team of experts will judge all papers submitted for this competition. To be eligible the investigator must indicate that the paper is based on research from an M.Sc. or Ph.D. degree. The investigator must not have presented *this work* in a refereed journal or at a major international conference. There is no age limit and the new investigator must be first author and personally present the paper. The award will be judged on the basis of the two page summary, the oral presentation and the final manuscript.

SYMPOSIUM

ON SPORTSHOES

AND PLAYING SURFACES

August 4-6, 1983

University of Calgary
Calgary, Alberta, Canada.

Call for Papers

The Conference Committee invites all members of the scientific community to submit summaries of studies which they wish to have considered for representation at a symposium on the analysis of sports shoes and playing surfaces. The Symposium on Sports Shoes and Playing Surfaces has been established as a satellite conference to be held prior to the IXth Congress of the International Society of Biomechanics and has received the approval and sponsorship of the I.S.B.

Instructions to Authors

The official language of all written and oral presentations is English. Papers are to present new ideas, findings and/or techniques and must not have been reported nor be in the process of being reported elsewhere. All submissions will be reviewed by the Scientific Committee and must meet the established deadlines. A two-page summary, including figures, should be submitted for review by the Scientific Committee. The summary should include key references, equations, figures as well as the research findings and their significance. Figures used should be clearly labelled and technically correct. Selection of the papers will be based upon relevance to the study of the areas concerned and upon the quality of content. (This summary will not be published.)

Final manuscript

Papers which are accepted for presentation and publication will be included in a monograph, which will be available prior to the Symposium. Instructions for the final manuscript will be sent with notice of acceptance.

Deadline for Authors

Submission of Summaries : February 1, 1983
Notification of Acceptance or Rejection : April 1, 1983.
Receipt of Final Manuscript for Publication : June 1, 1983.

Registration Fees

Full registration includes attendance at all sessions, a copy of the Proceedings, reception, banquet and refreshments in the morning and afternoon breaks.

Deadlines

Early (received prior to May 1, 1983)	$80.00 Can.
Regular (received after May 1, 1983)	$100.00 Can.
Students (early)	$40.00 Can.
Students (regular)	$50.00 Can.

Cancellation Policy

Those cancelling prior to June 15, 1983 will receive 75% of registration fees and a 50% refund after that date.

Conference Secretary

Marjorie Foofat
Faculty of Physical Education
The University of Calgary
2500 University Drive N.W.
Calgary, Alberta T2N 1N4