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Editorial

Due to unforseen curcumstances you have received the winter issue n° 29, 1987 in March 1988 with a delay of one month. We do apologize for this inconvenience but we hope to make up for it by sending this spring newsletter back on schedule.

This issue changed colour again indicating a new "green" year, a colour that goes together with springtime in our northern hemisphere, but also symbolicly with productivity.

A new year for your editors (Jan Cabri and myself) brings out renewed wishes but also renewed requests for copy.

Allthough we are doing well in "thesis abstract material" and "society news" we would like more topics on "laboratory features", "letters to the Editor" (on both research and educational matters), "propositions of software exchange" and "special articles". We hereby invite you once again to participate in "your" Newsletter.

We also invite you to send us a postcard from your country or city whenever you find the time, mentioning your "Electric Mail" and/or "Tele Fax number".

Once we have enough E.M. and FAX numbers, we can publish them in a (regularly returning item) hoping it can contribute to a better communication between ISB members, while the postcard will give us a visual impression of the place were the newsletter is read.

We look forward to hear from you.

Jan Pieter CLARYS
Editor.

CALL FOR PAPERS

We would appreciate if I.S.B. members could participate more active in this Newsletter.
Please send us material: short papers, letters to the editor, laboratory features,... etc.

Thesis abstract corner

THE UNIVERSITY OF ALBERTA

THREE DIMENSIONAL ANALYSIS OF HAMMER TROWING

by

Iraklis Kollias

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

Department of Physical Education and Sport Studies

Admonton, Alberta

Fall 1984

ABSTRACT

The purpose of this study was to develop techniques for analysis of the hammer throwing and to analyse the throwing technique of world caliber hammer throwers. The development of the techniques included testing of different versions of the DLT 3-D cinematographic method and the derivation of formulas, based on rigid body dynamics, for analysis of the kinematic and kinetic parameters involved in rotation of the human body.

The DLT was tested with and without mathematical models for image refinement and with calibration trees of different shape. A tree which was geometric in shape used with the basic DLT equations and with model IV for image refinement (Karara and Abdel Aziz, 1974) gave the best results of all the tests. The RMS error of the measured versus the simulated coordinates of the control point were found to be 0.24 cm. for the X-axis, 0.19 cm for the Y-axis and, 0.26 cm for the Z-axis. The method was also tested for areas outside the calibration tree. It was found that a well constructed tree with image refinement models can be used for calibration areas of larger volume than the one covered by the calibration tree.

The hammer throwing data were collected during the 1982 European Championship, with the best throw of three medalists being analysed. Lagragian interpolation formulas were used for the time-match of the coordinates derived from the two films. The data were smoothed with digital filters.

It was found that the maximum velocity of the hammer occurred before the release point. None of the athletes achieved an optimal angle of release, while the closer to the optimal angle achieved by the winner could give him the gold medal with the same difference in throwing distance. The acceleration of the hammer was maximum in the last double support phase of the throw. It was the duration of the acceleration in this phase that was critical for a successful throw. Another parameter that characterised the analyzed athletes was their ability to increase the acceleration of the hammer during the single support phase of each turn or at least not to decrease it a great deal. This was accomplish by decreasing the moment of inertia of the body about the vertical axis. All athletes achieved faster single support phases than double support phases in all the turns. The latter

was achieved by leaning backwards during the first half of the double support phase and by using the second half of this phase to initiate a fast rotation. The breaking of the horizontal movement in the last turn was critical for a successful throw. A relatively low center of mass of the body seemed to appropriate for controlling the movement in all the turns. A tall and/or heavy athlete does not necesseary have advantages against a shorter and lighter athlete. The length of the hammer should be shortened in order for athletes to perform mechanically better throws.

THE UNIVERSITY OF WATERLOO

BILATERAL ANALYSIS OF THE LOWER LIMBS DURING WALKING IN NORMAL INDIVIDUALS

BY

Sylvia Ounpuu

A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Science
in
Kinesiology

Waterloo, Ontario, 1986

Supervisor: Dave Winter

ABSTRACT

The assumption of symmetry is made frequently in the analysis of walking gait in order to simplify data collection and analysis. Despite this, no in depth studies of the bilateral aspect of human locomotion have been reported. The purpose of this study was to determine in normal individuals when walking, whether there were systematic asymmetries between the dominant and non-dominant lower limbs with respect to electromyographic, kinematic and kinetic variables. Electromyographic (EMG) data were collected from both limbs simultaneously on the following muscles: gluteus maximus, medial hamstrings, rectus femoris, vastus lateralis, tibialis anterior, medial gastrocnemius and soleus. All EMG signals were normalized by the average value obtained from three isometric contractions. To perform these isometric contractions, equal isometric torques were applied to each muscle in a muscle pair, for example the right and left soleus. Of the ten subjects (five right- and five left-footed), four were selected for a kinematic and kinetic analysis. EMG data were averaged over a minimum of twelve strides and the biomechanical data were averaged over four strides. As well as individual subject analysis, subjects were grouped by dominance to determine whether any relationship between asymmetry and dominance could be found. A repeated measures analysis of variance procedure was used to determine if significant bilateral differences ($p<0.05$) existed.

Across all subjects grouped by dominance there were no bilateral differences in any of the muscles except the soleus. The soleus muscle displayed significantly higher activity on the dominant than the non-dominant side during the stance phase. The medial gastrocnemius muscle also showed higher EMG activity on the dominant side but the differences were not statistically significant. Analyses on individual subjects showed that pooling subject data concealed bilateral differences that occurred at the individual level. Muscles showing significant bilateral differences were not consistent across all subjects. In each subject, at least three of the possible seven muscle pairs were significantly different.

Bilateral comparisons of the relative angles, joint moments and joint powers at the hip, knee and ankle showed no significant side differences when the subjects ($N=4$), were grouped by dominance. Individual subject analysis showed that bilaterally, significant differences appeared in certain joint moments and powers during specific phases of the gait cycle.

On the basis of the results obtained, the following conclusions were made:

1. The assumption of symmetry is not valid at the individual subject level.
2. There is a relationship between the plantar-flexor EMG and dominance. The dominant side soleus activity was significantly greater than the non-dominant for the pooled subject analysis.
3. The pooling of subject data conceals bilateral differences.
4. It is possible to normalize EMG signals and maintain absolute amplitude information by having each muscle in the muscle pair generate the same moment of force.

A DETERMINISTIC MODEL USING EMG AND MUSCLE KINEMATICS TO PREDICT INDIVIDUEL MUSCLE FORCES DURING NORMAL HUMAN GAIT

by

Scott White

Graduated Fall, 1986

Supervisor: Dave Winter

ABSTRACT

The anatomical redundancy of the human musculoskeletal system makes a unique solution for muscle forces difficult to ascertain. In this thesis, a neuromusculoskeletal model was presented as a method for resolving individual muscle forces during complex multisegment movements.

A forward solution using an EMG driven muscle model insituted at the level of the individual muscle was proposed. The equations describing the mechanical response of the muscle model were based on Hill's (1938) original work, but incorporated muscle length, velocity and excitation con-

siderations for eccentric and concentric muscle contractions. Processed EMG represented the neural input to the muscle. A musculoskeletal model defining the skeleton, and, line of action and architecture of each of the lower limb muscles was developed. Muscle kinematics were then calculated using the musculoskeletal model in conjunction with three dimensional cinematography. Muscle force as a function of length and level of excitation was also required as input to the model, and was established from a series of slow isokinetic calibration contractions.

Individual muscle force profiles were predicted for selected muscles of the lower limb using two subjects and two movements conditions: a normal walk, and a single leg squat motion. Results using the model were validated by summing moments calculated from the predicted muscle forces and comparing them to net joint moments calculated from limb kinematics and ground reaction forces using link segment mechanics.

The moment curves match closely in shape. The correlation between moments derived form the two approaches ranged from r = .72 to r = .97 for the gait trials. The correlations were also high for the squat movement. The R.M.S. difference between moment curves over one walking stride was about 12 N.m at the ankle, 15 N.m at the knee and 18N.m at the hip. R.M.S. differences were slightly higher for the squat trials, ranging from 13 tot 27 N.m. Expressed as a percentage of the R.M.S. of the moments calculated using the inverse dynamics solution, the differences ranged from 23 tot 34 percent at the ankle, 29 to 79 percent at the knee and 59 to 103 percent at the hip. The results were greater than R.M.S. differences of: 7 N.m at the ankle and 11 N.m at the knee, calculated from the model predictions of Olney and Winter (1985), but less than a R.M.S. difference of 23 N.m reported at the ankle (Hof et al., 1983) using the muscle model of Hof and Van Den Berg (1981). No studies could be found for comparing the results at the hip. It should be noted that the results of Olney and Winter (1985) were achieved by optimizing model parameters until a best fit to the moment curve calculated for the walking trial was realized. The approach of this thesis differs in that the model parameters were not optimized to fit the moment curves.

The nature of the moment curve differences suggested that the equation formalism of the muscle model was essentially correct, but that the constants in the model may not have been optimal. The results of the model prediction could be improved with a more accurate EMG calibration and a more accurate placement of surface markers identifying the bony landmarks used to determine the spatial location of segments and joint centres.

The results from this research support the feasibility of using the neuromusculoskeletal modelling approach proposed, as a potential solution to the indeterminancy problem, thereby giving a unique solution to muscle forces involved in normal human movements.

THE DEVELOPMENT OF FEEDFORWARD AND FEETBACK CONTROL OF POSTURE IN CHILDREN

by

Cindy Riach

Graduated Spring, 1986

Supervisor: Keith Hayes

ABSTRACT

A series of four studies was designed to elucidate the maturation of postural control mechanisms in young children. The first study explored the feasibility of using the centre of pressure of ground reaction forces (CP) for monitoring feedforward postural control. Thirty-one adult subjects stood stationary on a force platform and quickly raised the right arm forward. Consistent patterns of CP excursions preceded the arm raises thereby providing evidence of the feedforward control processes.

In the second study, the functional significance of the anticipatory CP excursions was investigated. The pattern of change of position of the centre of gravity (CG) was approximated by double integration of the horizontal ground reaction forces. It was established that the mechanics of the feedforward adjustments serve to attenuate the loss of stability introduced by the arm movement.

The third study investigated the maturation of feedforward postural control in young children (n = 33). Feedforward patterns of change in CP, similar to those of adults, were evident in the youngest children tested (4 years). Young children, however, were less consistent across trials than were the older subjects.

The final study investigated the maturation of feedback postural control as measured by changes in CP during quiet standing in young children (n = 43). The magnitude of postural sway reduced as a function of age in the lateral plane the young boys swayed slightly more than young girls. Boys improved at a faster rate than girls so that their sway magnitudes were approximately equal by age 10 years. Power spectral analysis showed that there was also some modification to the form of the spectral density function. Romberg quotients (RQ) indicated that the use of vision in maintaining stability increased with age.

These studies have established the use of CP measurements in the motoring of feedforward postural control, have indentified some new characteristics of feedforward control, and have outlined some new aspects of the development of feedforward and feetback postural control processes in young children.

THE PENNSYLVANIA STATE UNIVERSITY
THE GRADUATE SCHOOL
DEPARTMENT OF PHYSICAL EDUCATION

PRESSURE DESTRIBUTION UNDER THE IMPACTING HUMAN FOOT DURING EXPECTED AND UNEXPECTED FALLS

A Thesis in
Physical Education
by
Ewald Max Hennig
Submitted in Partial Fulfillment
of the Requirements
for the Degree of
Doctor of Philosphy
December 1984
Supervisor: J. G. HAY

ABSTRACT

Pressure distribution under the right foot of 30 male subjects was determined for expected and unexpected falls from a height of 20 cm. A piezoelectric pressure distribution platform with 1000 separate force transducers (resolution 7.6 mm times 7.6 mm) was used for the measurements and an Apple II+ microcomputer and a PDP 11/34 minicomputer were used for data collection and evaluation. A Megatek graphics computer was employed for the visual representation of the pressure data. The thirty feet were divided into the groups cavus, normal, and planus by means of midfoot area measurements from foot contact imprints. Each group contained ten feet. Foot contact imprints from standing and falling were also analyzed by using linear and area measurements of forefoot, midfoot, and rearfoot. A displacement transducer was employed to determine the height of the foot dorsum and its deflection during load bearing. For regional kinetic analyses all feet were divided into ten anatomical regions: two rearfoot, two midfoot, three metatarsal head, and three toe regions. For the statistical evaluation of all kinetic measures, a two factor Analysis of Variance was used.

Between foot groups, statistically significant differences were found between all midfoot parameters, dorsal arch height, and the dorsal arch deflection ratio. The vertical peak force analysis revealed increased values during unexpected falls, however, no differences between foot groups were found. Statistically significant differences between falling conditions were found for the regional peak pressures in five out of ten anatomical regions and for the normalized regional impulse in six out of ten regions. During unexpected falls the rearfoot exhibits the largest loads whereas during the expected falls increased load bearing was seen in the lateral fore- and midfoot regions. Planus feet showed greatly increased midfoot pressures and reduced loads in the first metatarsal head regions. In the rearfoot and the first metatarsal head regions the cavus feet exhibited higher pressures than the normal and planus feet. The relationships between normalized midfoot impulses and foot descriptor measures were established and good correlations were found between midfoot impulse and same of the foot descriptors.

The analysis of the foot dimensions, peak pressures and regional impulses resulted in findings which help in the understanding of foot function and can be useful for the design of footwear.

THE UNIVERSITY OF ALBERTA

BIOMECHANICAL ANALYSIS OF STAND-UP AND WHEELCHAIR BASKETBALL SET SHOOTING

by

Yuval Higger

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of Master of Science

Department of Physical Education and
Sport Studies

Edmonton, Alberta
Fall 1984

ABSTRACT

The purpose of this study was to examine selected kinematic and kinetic factors in the performance of the one hand basketball set shot as performed by stand-up basketball players and wheelchair basketball players of different levels of physical disability. Kinematic information was obtained from the analysis of data films, whereas resultant muscle torques were computed using principles of rigid body dynamics. For this purpose, individuals' body segment parameters were estimated. It was found in this study, that wheelchair basketball players projected the ball with a greater speed of release and a higher angle of release than did stand-up basketball players. Nevertheless, balls projected by wheelchair basketball players approached the rim with a slightly smaller angle of approach. It was also found that wheelcair basketball players generated greater muscle torques in order to propel the ball toward the rim. However, the increased torques were not proportionately distributed. Shoulder flexion and shoulder extension torques of wheelcair basketball players were relatively greater than their elbow extension and wrist flexion torques. Class II wheelchair basketball players and clas III wheelcahir basketball players projected the ball employing almost identical trajectories. To do so, class II and class III wheelchair basketball players generated similar shoulder flexion and shoulder extension torques, but class II wheelchair basketball players generated smaller elbow extension and wrist flexion torques. Considering the differences in body segment parameters between class II and clas III wheelchair basketball players in this study, it was speculated that when compared to class III wheelchair basketball players, class II wheelchair basketball players generated relatively greater shoulder flexion and shoulder extension torques than elbow extension and wrist flexion torques.

Past Conference News

THE 1st INTERNATIONAL SYMPOSIUM ON COMPUTER SIMULATION IN BIOMECHANICS

Was organized and sponsored by the WARSAW UNIVERSITY of TECHNOLOGY
Institute for Aircraft Engineering and Applied Mechanics; Under the auspices of the INTERNATIONAL SOCIETY of BIOMECHANICS, and Co-sponsored by the INSTITUTE of SPORT in Warsaw on June 25-27, 1987.

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Opening lecture:
K. Kedzior, A. Komor, J. Maryniak, J. Morawski: *Methodological and cognitive aspects of mathematical modelling and computer simulation in biomechanics*

Session I. General problems of modelling in biomechanics

Survey lecture:
H. Hatze: *Modelling and simulation of the human neuromusculoskeletal system*

Ch. L. Vaughan: Validating a computer simulation model of human motion interactively

K. Jaworek: Study of human motion activities using phase diagrams

T. Kojima: Precision in numerical solutions of differential equations in the simulation of a human movement with a mathematical model

A. Siemienski: Verification of optimization criteria by using the computer simulation method

A. Samsonova: Neuronal mechanisms of human run

Session II. Silulation of human body motion I

Survey lecture:
M. Hubbartd: *Some essential features of successful computer simulation of human motion in biomechanics*

A.O. Minenkov, M.E. Schtein, A.V. Ostroumov, A.V. Neder: Movement analysis of figure skater using computer graphics in interactive mode

K. Kedzior, B. Macukow, J. Ostrowski: Computer simulation of bobsled and luge downhill run

A. Komor, L. Parfianowicz: An attempt of cycling motion technique optimization by use of interactive computer simulation

A. Komor, R. Uklański, J. Wolf: An interactive simulation of rower-boat system dynamics

R. Pekalski: Modelling and simulation of bow-arrow system dynamics

Session III. Simulation of human body motion II

J. Sukop, L. Stolc: Computer aided instructions in the feedback control of the athlete's activity

A.J. van den Bogert, A.A.H.J. Sauren: Computer simulation of the equine hindleg during locomotion

F. Hildebrand: Simulation of airborne movements of non-rigid bodies

M. Knauf: A system for simulation of movements of limb links

J. Morawski: Effects of resonance and detection in biomechanics

R. Maroński: An alternative method of solving the problem of the optimal downhill ski run

Session IV. Software & hardware oriented in biomechanics

Survey lecture:
A. Pedotti: *Perspectives in human motion analysis*

R.N. Marshall, M.J. Toomey: LIMBSIM - a computer simulation package for teaching

C. Rzymkowski: A package of computer programs for equations of motion generation for biomechanics applications

J. Barton, G.J. Barton: Data processng software programs adapted to different sports techniques

U. Persyn, D. Daly, L. Van Tilborgh, V. Colman, C. Verbrugge: Didactical interactive software and calculation programs for cycling

V. Colman, U. Persyn, L. Van Tilborgh, D. Riemaker: Didactical interactive software for swimming instruction

A.S. Aruin, B.I. Prilutsky: Simulation of a human body in computerized designing of working places

R. Bedziński, W. Damczyk, A. Stomka: Three-dimensional finite element model of the lumbar vertebra

M. Dietrich, A. Jaworski, K. Kedzior, G. Krzesiński, P. Tulin, T. Zagrajek: Application of finite element method to modelling of human skeletal system

The full texts of all the accepted and presented papers will be published in the special issue of *Biology of Sport* (quarterly by Institute of Sport, Warsaw).

Calender of scientific events

CALENDER OF WORLDWIDE INTERNATIONAL SCIENTIFIC EVENTS FROM 1988 UNTIL 1990

May 29 - June 03, 1988
Toronto, Ontario, Canada. The International Conference on Exercise, Fitness and Health (c/o The International Conference on Exercise, Fitness and Health Ontario Group Fitness Office, 1220 Sheppard Avenue East, Toronto, Ontario, Canada M2K 2X1).

June 1-4, 1988
London, Ontario, Canada. 7th Int. Symp. on Biochemistry oif Exercise, Theme: "Biochemical Strategies in Response to Altered Functional Demands" (c/o Dr. A.W. Taylor, Fac. of Phys. Ed., Univ. of Western Ontario, Thames Hall, London, Ontario N6A 3K7, Canada).

June 6-10, 1988
Wroclax, Poland. "7th School on Biomechanics and Summer School on Biomechanics", Theme: Biomechanical Tests on Static and Dynamic Human Movement Potential" (c/o Dr. L.B. Dworak, Academy of Physical Education, Park Kasprzaka, 60-776 Poznan, Poland) Tel.: 208-081 208-113 Cable: 041-32-30 Poland.

June 14-17, 1988
Berlin, GDR. "Aims, Contents and Scientific Foundation of Fitness Tests" (c/o Prof. Dr. B. Schellenberger, Insitut für Freizeit- und Erholungssport, Deutsche Hochscule für Körperkultur und Sport, Friedrich-Ludwig-Jahn-Allee 59, 7010 Leipzig, GDR. Tel.: (41) 4974170. Telex: 051275 dhfk dd.

June 20-23, 1988
Twente University Enschede The Netherlands. 7th Congress of the International Society of Electrophysiological Kinesiology. Info: Ikek 88, Congress secretratiat, P.O. Box 3210, 7500 AH Enschede, The Netherlands, Tel. (0)53-33.80.25. Telex 44200. Telefax (0)53-89.33.60.

July 18-22, 1988
Paris, France. 12th IMACS World Congress on Scientific Computation (c/o The Secretary 12th IMACS World Congress, IDN, BP 48, 59651 Villeneuve D'ASCE CEDEX, France).

July 20-23, 1988
Exeter, Devonshire, UK. "Fifth International Auxology Congress" (c/o Prof. J.M. Tanner, V. Auxological Congress, Room 115, Insitute of Child Health, 30 Guilford Street, London, UK, WC1N 1EH, England).

July 24-31, 1988
Zagreb, Yugoslavia. 12th International Congress of Anthropology and Ethnological Sciences (c/o Laboratory of Anthropology, Insitute for Medical Research and Occupational Health, Mose Pijade 158, P.O. Box 291, 41000 Zagreb, Yugoslavia, tel. 041/432-186 of 432-286.

July 26-31, 1988
Madrid, Spain. "1988 AIESEP World Convention". Theme: "Humanism and New Technology in Physical Education and Sport - The Present Situation and Prospects" (c/o Prof. J. L. Hernandez Vasquez, Instituto Nacional de Eudcaiòn Fisica, Ciudad Universitaria, Avda Martin Fierro, s/n Madrid, Spain)

Aug. 1-5, 1988
Sydney, Australia. "10th Congress of the International Ergonomics Society" (c/o Secretariat IEA88, P.O. Box 380, Spit Junction NSW 2088, Australia) Tel.: (02) 9691400

Aug. 6-12, 1988
Orebro, Sweden. "SWEDUCATION & ICHPER Europe Congress, Theme: "Physical Education, Health and Development of the Human Being" (c/o SWEDUCATION, P.O. Box 923, 70130 Orebro, Sweden) Tel.: (19) 140100

Aug. 8-12, 1988
Finnish Fair Centre, Helsinki, Finland. "3rd International Conference on Environmental Ergonomics" Institute of Occupational Health, Finland SINTEF, Norway.

Aug. 16-19, 1988
The First Biennal Conference of the Canadian Society for Biomechanics. (Secrétariat: CSB Conference / Symposium on human locomotion - Department of Kinanthropology - University of Ottawa 35 Mc Dougal Lane - Ottawa (Ontario) Canada, K1 N 6N5)

Aug. 21-27, 1988
17th Congres International de Mécanique Théorique et Appliquée. (Secrétariat: ICTAM 88 - Institut de Mécanique de Grenoble - Domaine Universitaire B.P. 68 - F. 38402 St. Martin d'Heros Cedex).

Aug. 26-31, 1988
Hong Kong. "VIth International Symposium on Comparative Physical Education and Sport". Theme: "Competition in Sport" (c/o Dr. Frank Fu, Dept. of Phys. Educ., Chinese Univ. of Hong Kong, Shatin NT, Hong Kong) Tel.: (852) 540-7637.

Aug. 28 - Sep. 2, 1988
Washington, USA. "First World Congress on Fitness for Life" (c/o Mr. George Allen, President's Council of Physical Fitness and Sport, Washington, D.C. 20202, USA)

Sept. 4-8, 1988
11th Annual Meeting of the European Neuroscience Association. (Secrétariat: Brain Research Institute - University of Zurich August Forel - Sr. 1 - 8029 Zurich)

Sept. 5-7, 1988
Osaka, Japan. "1988 Symposium of the International Council for Physical Fitness Research". Theme: Current topics in the physical fitness research on the Aged, the Disabled and the Industrial Worker" (c/o Secretariat of ICPFR Symposium '88 Osaka, Osaka College of Physical Education, Gakuen-cho 1-1, Ibaraki-shi, Osaka 567, Japan) Tel.: 0726-34-3141 - Fax: 0726-34-8374

Sept. 5-8, 1988
Budapest, Hungary. "6th Congress of the European Anthropological Association" (c/o Congress Secretariat, Dept. of Anthropology ELTE, Puskin ucta 3. Budapest, Hungary, H-1088) Tel.: (36-1) 187-857

Sept. 9-15, 1988
Seoul, Korea. "Seoul Olympic Scientific Congress". Theme: "New Horizons of HumanMovement: Issues and Implications for Development, Performance and Health" (c/o 1988 Seoul Olympic Sicentific Congress Organizing Committee, RM 203, Dankook Bldg, n° 97. Nonhyun-dong, Kangnam-ku, Seoul 135, Korea) Te.: (02) 542-8886, 546-8837/8 Telex: DK Univ K 227741, Bumju K 22962. Fax: (02) 546-0356

Sept. 11-14, 1988
Bristol. european Society of Mechanics Meeting. (Secrétariat: Dr. A.E. GOODSHIP School of Veterany Science Park Row - Bristo - BS1 5 LS - UK).

Sept. 15-16, 1988
Louvain. XIIIème Congrès de la Société de Biomécanique. (Secrétariat: Dr. L. PLAGHKI Université catholique de Louvain Service Médecine physique Réadaptation 10 Avenue Hippocrate, 1020 Bruxelles, Belgique).

Sept. 20-22, 1988
Progress in Bioengineering. Artificialorgans, deliveru of rehabilitation, orhtopaedic Biomechanics, prosthetics and orthotics, technological advances. A international seminar on the occasion of the 25th anniversary of Strathclude Bioengineering Unit. Bioengineering Unit Wolfson Centre University of Strathclyde Glasgow, Scotland. Tel. 041-552-4400 Ext. 3029. Telex 77472 (UNSLIB G). Fax: 041-552-0775.

Sept. 28-30, 1988
Toulouse. Colloque International: Interactions Homme-Médecine et Intelligence Artificielle dans les domaines de l'aéronautique et de l'espace. (Sécretariat: G. PICCHI - CERT - B.P. 4025 31055 Toulouse Cedex).

Sept. 28-30, 1988
University of Illinois at Urbana-Champaign. Meeting announcement and call for papers. Manssour H. Moeinzadeh, Ph. D. Meeting Chairperson, ASB. Department of General Engineering. University of Illinois at Urbana-Champaign, 104 South Mathews Avenue. Urbana, Il 61801 USA (217)333-0406

April 27-29, 1989
Leuven, Belgium "XIVth Meeting of the European group of Pediatric Work Physiology" (c/o Prof. Dr. G. Beunen, K.U.L., I.L.O., Tervuurse Vest 101, 3030 Heverlee, Belgium) Tel.: 016/22.23.10

May 14-19, 1989
Papendal, The Netherlands, "IXth Congress for Sports Information", Theme: "Effective Sports Information for the Nineties" (c/o: Rob Timmer, Secr. Gen. of IASI, Laan van Meerdervoort 1a, 2517 AA The Hague, The Netherlands) Tel.: (070)632963. Telex: 34379 nsfsp.

June 21-24, 1989
Berlin (West), FRG, "7th Intern. Symposium Adapted Physical Activity - an interdisciplinary approach" (c/o 7th ISAPA BERLIN '89, Secretary, Institut für Sportwissenschaft, Freie Universität Berlin, Rheinbabenallee 14, D-1000 Berlin 33) Tel.: (030)824.37.31.

June 26-30, 1989
Los Angeles, "XII Intern. Congress of Biomechanics" (c/o XII Intern. Congress of Biomechanics, UCLA Deptm. of Kinesiology, 2854 Slichter Hall, Los Angeles, CA 90024-1568, USA. Tel.: (213)825-3910 of 825-5376.

Sept. 11-15, 1989
At the London Hospital, London, England. VIIIth World fina Medical Congress on Aquatic Sports. Further Information: Conference Service Limited, Aldine House, 9-15 Aldine Street, London W12 8AW. Tel: 01-740 8121 (International 2 44-1-740 8121) Telex: 916024 Confer G.

Jan. 28-Feb. 02, 1990
Auckland, New Zealand, IXth Commonwealth and International Conference (c/o Conference Convenor 1990, Ms. Rosalie King, Auckland College of Education, Private Bage, Symonds St., Auckland, New Zealand).

May 27-June 01, 1990
Amsterdam, The Netherlands, XXIV FIMS World Congress of Sports Medicine (c/o Organisatie Bureau Amsterdam b.v., Europaplein 12, 1078 GZ Amsterdam, The Netherlands, Tel.: 31/2044087. Telex: 13499 raico nl).

(date and place to be fixed)
International ISAK-congress "Kinanthropometry IV"

(date & place to be fixed)
"6th Symposium on Biomechanics and Medicine of Swimming"

(date to be fixed)
Maastricht, The Netherlands, Second World Congress of Science and Football (c/o Prof. J.M. Greep, Deptm. of Surgery, Academic Hospital St. Annadel, Maatstricht, The Netherlands)

Changes in ISB Constitution

Proposed Changes in ISB Constitution

Words in *Italic* in proposed revision indicate changes in the current constitution.

Current Statement	Proposed Revision
Article 1 - The International Society of Biomechanics ISB is an international organization with headquarters inthe locality where the President resides.	The International Society of Biomechanics (ISB) is an international organization with headquarters *at the adress of the Treasurer.*

Rationale: The President changes every two years whereas the Treasurer would normally have a longer tenure of office.

Article 3, Section 3.3 - Collective members who shall be national associations on Biomechanics or related organizations with approved and effective by-laws.	*Affiliate* members who shall be national associations on biomechanics or related organizations with approved and effective by-laws.

Rationale: Executive Council voted to change name of collective members to affiliate members. (6/85).

Article 6, Section 6.5 - The General Assembly shall approve and grant all collective memberships. Nominations shall be made by the Executive Council and approval shall be by open vote.	The General Assembly shall approve and grant *affiliate* memberships *upon recommendations by the Executive Council.* Approval of affiliate membership shall be by open vote.

Rationale: Affiliate members submit constitution and by-laws to the President who presents the affiliate member to the Executive Council for a formal recommendation.

Article 6, Section 6.10 - Honorary members and full members shall have one vote each. Each collective member (organization) shall have one vote.	Honorary members and full members shall have one vote each. Each *affiliate* member (organization) shall have one vote *which shall be cast by its delegated representative. Each affiliate member shall provide the Secretary General with the name of its voting delegate in writing prior to the convening of the General Assembly.*

Rationale: If an affiliate member has only a single vote the affiliate should indicate who shall be its official voting delegate. Other members may contribute to discussion but not vote.

Current Statement	Proposed Revision
Article 8, Section 8.1 - Dues of at least $5. For individuals, or an equivalent credit slip, per annum must be paid by January 1st to the Treasurer for administrative expenses. (Annual dues changed to $15. U.S. in August, 1981).	*Annual dues for individual members are payable to the Treasurer on January 1st of each year.*

Rationale: Eliminate statement of exact amount of dues which is voted upon by the General Assembly (Article 6, Section 6.7).

Article 8, Section 8.2 - Honorary members shall be exempt, whereas collective members pay an amount of $30. (This amount was changed to $100. in 1985).	Honorary *and affiliate members* shall be exempt *from annual dues.*

Rationale: Affiliate members are recommended to be exempt from dues by vote of the Executive Council (8/86).

Article 8, Section 8.3
None - new section

Individual members who fail to remit annual dues for three successive years shall be automatically placed on the inactive list and shall forfeit all privileges of the Society. Members placed on an inactive status for non-payment of dues may be reinstated to full membership upon payment of an amount equivalent to three years of annual dues. Members who resign from active membership and are not in arrears in dues may be reinstated to active membership upon payment of one year's annual dues.

Rationale: This is the policy under which the Treasurer now operates yet there is no written statement to follow. This provision eliminates the possibility of a member being able to pay dues on an irregular basis and return to full membership without fulfilling financial obligations.

3/12/87

INTEREST GROUP ON BI-ARTICULAR MUSCLES

During the XI-th international Congress of Biomechanics in Amsterdam, a number of researchers appeared to have much interest in the potential functions and actual actions of bi-articular muscles.
On the initiative of Prof. Dr. Minayori Kumamoto and Dr. Gerrit Jan van Ingen Schenau a first meeting was organized where a few principles were demonstrated. The participants of this meeting decides to form an "Interest group on bi-articular muscles" with special interest to two and three-joint movements of the lower extremity.
The group intends to take the following actions in the next two to four years:

a. exchange of relevant papers, accepted manuscripts and ideas between the members of the group,
b. organization of a meeting of the group during the next ISB-Congress,
c. promotion of a special session on bi-articular muscle functions at the XII-th and/or XIII-th ISB Congress.

The group consists of 20 members currently and invites all researchers with special interest in this field to join us and contact Prof. Kumamoto.

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INSTRUCTION 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.
2° The title should be written in CAPITAL LETTERS.
3° Subtitles should be written *in italics* and/or underlined.
4° Different paragraphs should be seperated by double spacing.
5° Try to use the whole text-frame. There should not be any margines inside the frame.

Thank you in advance for your cooperation.

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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 Autumm issue, and November 10 for the Winter issue.

Membership news

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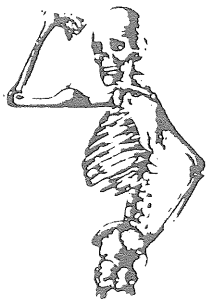

When individual members have a change in a mailing adress, it is important to send the new address to the Treasurer so that you are certain to receive copies of the Newsletter an dues notices.

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