



International Society of Biomechanics Newsletter

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AFFILIATE SOCIETIES OF ISB:

American Society of Biomechanics; British Association of Sport and Exercise Sciences; Bulgarian Society of Biomechanics; Canadian Society of Biomechanics/Société canadienne de biomécanique; Chinese Society of Sports Biomechanics; Comisia de Biomecanica Inginerie si Informatica (Romania); Czech Society of Biomechanics; Japanese Society of Biomechanics; Korean Society of Sport Biomechanics; Polish Society of Biomechanics; Russian Society of Biomechanics; Société de biomécanique (France).

From the President- Peter Cavanagh
How will academic publishing be defined
in the next decade?

Dear ISB Members:

I want to start by thanking all those who responded to my initiative at the end of 1996 to provide materials for colleagues in economically developing countries. The response to this effort was a rich haul of journals, books, and some equipment which council member Sandra Olney is in the process of distributing to laboratories throughout the world. This will be an ongoing program of the Society and I urge you to keep the material flowing to Sandra (olneys@quecn.queensu.ca). A summary of what has been accomplished under this initiative will appear soon on our Web page (<http://www.kin.calgary.ca/isb/>).

As regular readers of this column will know, it is my custom to pose a question each three months that might cause the reader some degree of professional introspection. My question for this quarter is "How will academic publishing be defined and practiced in the next decade?"

This question can be answered from two different and potentially conflicting viewpoints: publishing to disseminate knowledge and publishing to obtain academic tenure. Ideally, there should be no tension between these points of view but, in practice, there is an enormous gulf. As you might expect, this issue is intimately involved with the Internet and the current explosion of easily available information. Let me pause to point out that I have used two words in this paragraph that should not be considered synonyms: knowledge and information. I have a friend who avoids the Internet with a passion because, he declares, "I don't need more information - I need more knowledge." And herein lies the problem: in the age of the Internet who will judge whether we as academics are contributing to knowledge or to information? The former would certainly qualify as a justifiable scientific endeavor (and would, therefore, be potentially tenurable), while the latter probably would not.

Traditionally, new contributions to knowledge have been scrutinized by the peer review system. Refereed journals are the safeguard that the

scientific community has developed to impose quality control. Although some notable gaffes (such as physicist Alan Sokal's hoax article "Transgressing the Boundaries - Towards a Transformative Hermeneutics of Quantum Gravity" that was accepted and published after glowing peer reviews in the academic journal *Social Text*) have recently called this system into question, most academics would grudgingly agree that they cannot immediately suggest a better alternative. The peer review system is, however, far from perfect.

A serious counterpoint to the relative intellectual safety of a peer reviewed paper is that it comes at a high cost in terms of timeliness. One only needs to review the first page of articles in any scientific journal and compare the first submitted dates with the publication date of the journal. Intervals of between one and three years between submission and publication are not uncommon. These delays are almost inevitable given the many checks and balances in the system and the fact that reviewers and journal editors perform their tasks out of dedication to the field and receive either no compensation or inadequate compensation.

My contention is that we have come to accept the unacceptable. How can it be reasonable that it might take three years before you or I have the opportunity to read about an important advance in our field? It is reminiscent of the posthumous publication of "Der Gang des Menschen" (The Human Gait), the last chapter of which appeared in 1904, long after Wilhelm Braune's death and approximately 13 years after the data were collected. So here we are in the midst of the "information age" with publication delays that are not too far from those encountered at the end of the last century.

In contrast, the Internet offers the possibility of instant publication. As a researcher, I could discover new knowledge from an experiment or model one morning and put it up on my Web site in the afternoon. A quick note on BIOMCH-L would alert 2500 interested individuals of the presence of this new finding and the cause of knowledge would seem to have been served at the speed of light. While this might at first seem like the ideal situation, a pause for thought raises some thorny issues.

First and foremost is the issue of the veracity of the findings. It is really an expression of the noise versus knowledge question. On the Internet, all apparent knowledge has equal face value to the casual consumer, who then becomes the peer reviewer. This is clearly a less than desirable situation and one which is susceptible to hoax, scientific fraud, carelessness, genuine error, and simple incompetence.

Next, let us overlook the veracity issue and assume that the newly posted knowledge - carefully researched, accurately formulated and presented - is a really important advance and something that might find a place in a premier refereed journal. Let us examine the impact of immediate Internet publication of such a finding on the career of a young academic. At present, any Internet publication is ethereal - temporary, sometimes inaccessible, intangible, and subject to change or deletion. Few department chairs in the foreseeable future are likely to give credit for such postings as valid evidence of research competence which might form the basis for awarding a job for life. There is simply too much uncertainty in the medium for the message to carry substantial weight. In addition, the issue of primacy of a publication is one which the Internet makes more difficult to determine. How does one establish that one really had the idea first and that this idea was not just something which was encountered during a productive evening of academic Web surfing?

This is the kernel of the conflict between instant dissemination of new knowledge and the present criteria for academic advancement: the best interests of science are served by immediate dissemination but the best interests of the investigator are served by journal publication which may delay the appearance of the finding for several years. One strong argument is that the guidelines for tenure are (or even the process of tenure itself is) archaic and that this example demonstrates a major flaw in the institution. However, for the foreseeable future, this is the system under which we must live.

Are there solutions to the dilemma identified here? One possible scenario is the following: Professional societies such as the ISB could provide a site where short reports could be Emailed. The Society would also offer intervals of paid telecommuting employment to qualified

reviewers who have time to devote to the task of instant report review. The report would be assigned a score by two such reviewers and then posted within 48 hours of receipt on the Electronic Journal of the ISB with the score attached. Qualified readers (e.g. ISB members) could also assign a score which would be updated as a running average as each reader expressed an opinion. There would be no revisions by the author and thus no long delays in posting. Each 14 days the Journal would be indexed and archived at a site where easy retrieval was possible. One stipulation would be that the data must be available for review on the author's own web site.

You may be familiar with journals such as Behavioral and Brain Sciences which allow potential reviewers to FTP the manuscript and submit written commentaries to which the authors respond. Unfortunately, this process - despite its thoroughness - is only slightly more expeditious than conventional journal publishing.

My suggestion, described above, is certainly not a carefully constructed, researched, or benchmarked model. However, I hope that it will stimulate debate. Some method must be found to use the power of the Internet to exploit rapid dissemination of knowledge while satisfying the many other scientific and academic constraints. Let me know your suggestions (prc@psu.edu) and details of any other precedents that you may have seen. This could lead to an altogether new and exciting venue for your research findings and we could be breaking ground for other disciplines!

From the Editor-Mark D. Grabiner

In the last issue of the Newsletter the no-winner was announced for the Worst Biomechanical Analogies Contest. Presently, the results of the ISB member Santa Claus look-alike contest have been tabulated and it can now be reported that there were no entries. Of course, this raised my hopes that I could set a Newsletter Editor record for the number of consecutive contests for which there was an overwhelming amount of no support. Imagine my shock upon receipt of an actual entry for the third contest (announced in the Nov-Dec 96 issue) in which identification of a research graphic was requested. The entry, sent in by Paul Devita, Greensboro, NC, was as follows:

1. source of figure: the state of Wisconsin
WRONG!

2. caption: Wisconsin - Land of Cheese

WRONG!!

3. space ratio - The figure should be on a 1:1 scale, making it the size of Wisconsin. Therefore the ratio will be zero.

WRONG!!!

However, thanks for playing, Paul, and better luck next time on *Name That Graphic*.

**From the Executive Council
Ron Zernicke, Past President**

Please take a few moments to consider the CV's of the candidates on this year's ballot and vote for your choices. The ballot includes nominees for President-elect and Executive Council members. Full instructions were included with the ballots but briefly, vote for one (1) nominee for President-elect and a maximum of ten (10) nominees for the Executive Council. Ballots must be received in my office by August 1.

The last ISB of the 20th Century!!

The XVIIth Congress of the International Society of Biomechanics will be held in Calgary, Canada. The date of the conference is tentatively set for August 8-13, 1999. The organizing committee is currently in the process of selecting keynote and invited speakers for the conference. The committee would like to invite members of the biomechanics community to become involved by providing suggestions for possible keynote and invited speakers at the conference. As well, the committee is planning to arrange several symposia related to various topics and would also be interested in suggestions for possible topics, speakers and chairpersons. Suggestions can be sent to:

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Job Market

Faculty Positions

♦ The Department of Health & Performance Sciences at the Georgia Institute of Technology has a tenure track position available (Assistant or

Associate Professor), in the area of movement science. Research interests focusing on the biomechanics of movement as it relates to skeletal muscle and hard tissue mechanics (bone) are desirable. Contact: R.J. Gregor, Ph.D. Chair of Faculty Search Committee, Department of Health & Performance Sciences, The Georgia Institute of Technology, Atlanta, Georgia 30332-0110, Tel: 404-894-1028, Fax: 404-894-7593, Email: robert.gregor@sac.gatech.edu

♦ An Assistant Professor position for an individual with a specialization in biomechanics and a strong secondary interest in motor control is available in the Department of Exercise Science and Physical Education at Arizona State University. Contact: P.E. Martin, PhD, Department of Exercise Science and Physical Education, Box 870404, Arizona State University, Tempe, Arizona 85287-0404, Tel: (602)965-1023, Fax: (602)965-8108, Email: philip.martin@asu.edu

♦ The Department of Orthopedic Surgery at Northwestern University Medical School has a new position available for a full-time Research Director. The candidate will have a Ph.D. in Biomechanics, Bioengineering or related disciplines, or be MD. Ph.D. with similar training. The candidate will have had significant experience as a researcher with a history of successful publication in peer reviewed journals and of extramural funding. Previous leadership in the administration of an Orthopedics related research program would be an advantage. Contact: Z. Rymer, MD., Ph.D., Chair of Search Committee, Research Director in Orthopedics, c/o Sensory Motor Performance Program, Room 1406, Rehabilitation Institute of Chicago, 345 E. Superior, Chicago, IL 60611, Tel: (312)908-3381, Fax: (312)908-2208, Email w-rymer@nwu.edu

♦ The Department of Biomedical Engineering in the College of Engineering of the University of Miami is offering two tenure track positions at the assistant professor level. Areas of specialization include 1) the biomaterial sciences with an emphasis on materials suitable for implantable devices; 2) medical signal/image processing and instrumentation. Contact M. Sacks, PhD, PO Box 248294, University of Miami, Coral Gables, Florida 33124-0621, Email: msacks@coeds.eng.miami.edu

- ◆ The University of Pittsburgh announces the availability of four Bioengineering Faculty Positions. Applicants should hold a Ph.D. and have significant experience in an academic setting including a proven track record of leadership and scholarly accomplishment. Some areas that we are particularly interested in enhancing are: biomaterials, cellular > bioengineering, computational bioengineering, biosignal processing, and biomedical device manufacturing. Contact: J.S. Schultz, PhD, Bioengineering Program, The University of Pittsburgh, 300 Technology Drive, Pittsburgh PA 15219, Email: jssbio@vms.cis.pitt.edu
- ◆ The Department of Kinesiology and The Center for Locomotion Studies (CELOS) at Penn State University are reopening a search for two tenure-track faculty members (one Assistant Professor and one Associate Professor) who will each divide their time equally between teaching in the Department and conducting research at the Center. A Ph.D. or equivalent terminal degree is expected. Contact: P.R. Cavanagh, Ph.D., Chair of Faculty Search Committee; Center for Locomotion Studies; Penn State University; Box 100A; Room 10 IM Building; University Park, PA, 16802-2002.
- ◆ The Department of Kinesiology & Physical Education, California State University, Long Beach offers a tenure track Assistant/Associate Professor in Biomechanics. Contact: M. Lacourse, PhD, Chair, Biomechanics Search Committee, Department of Kinesiology and PE, California State University, 1250 Bellflower Boulevard, Long Beach, CA 90840, Tel: 310-985-4558, Fax: (310)-985-8067, Email: mlacours@csulb.edu
- ◆ A tenure track position of open rank is available for an individual with expertise in the areas of Human Factors/ Ergonomics. Contact: M.G. Wade, Ph.D. School of Kinesiology and Leisure Studies, University of Minnesota, 111 Cooke Hall, 1900 University Ave. SE, Minneapolis, MN 55455, Tel: (612) 625-0555, Fax: (612) 624-2509 Email: mwade@tcumn.edu
- ◆ The Department of Exercise and Sport Sciences at Ithaca College has opening at the level of Assistant Professor for an individual to teach undergraduate Kinesiology/Functional Anatomy and associated labs. Contact: T. Swenson, Ph.D., Department of Exercise and Sport Sciences, Ithaca College, Ithaca, NY 14850-7913. Tel: (607)274-3114 Email: TSwenson@Ithaca.edu
- ◆ A faculty position at the rank of assistant Professor is available for an individual with a specialization in Biomechanics in the Department of Kinesiology at the University of Nevada Las Vegas. Contact: B. Mangus, PhD, Department of Kinesiology, University of Nevada Las Vegas, P.O. Box, 453034, Las Vegas, NV 89154-3034, Tel: (702)895.0996.
- ◆ A tenure-track faculty position in Biomechanics is available in the Department of Physical Education at Brigham Young University beginning in the Fall of 1998. Contact E. Durrant, PhD, Department of Physical Education, P.O. Box 22116, 221-F Richards Building, Brigham Young University, Provo, UT 84602-2116. NOTE: Brigham Young University, an equal opportunity/affirmative action employer, is sponsored by The Church of Jesus Christ of Latter-day Saints and requires observance of Church standards. Preference is given to LDS applicants.
- ◆ An Assistant Professor level position in Kinesiology/biomechanics in the School of Physical Education, Ball State University. Contact: J.E. Reno, PhD, School of Physical Education, Ball State University, Muncie, IN 47306, Tel: (317)285-1451, Fax: (317)285-5610, Email: jreno@wp.bsu.edu
- ◆ The Department of Mechanical Engineering at the University of Kentucky has one (perhaps two) tenure track positions available at the assistant or associate professor levels. Preference will be given to those with expertise in transport phenomena applied to such areas as cellular systems processes, transport processes in the cardiopulmonary systems, and artificial internal organ or medical device design. Contact: C.F. Knapp, PhD, Center for Biomedical Engineering, Room 209, Wenner-Gren Research Laboratory, University of Kentucky, Lexington, KY 40506-0070, Tel: (606)257-2894, Email: knapp@cbme.uky.edu, <http://www.uky.edu/RGS/CMBE/> and <http://www.engr.uky.edu/>
- ◆ The Department of Kinesiology at the University of Waterloo invites applications for a tenure-track faculty position, at the rank of Assistant Professor, in the field of biomechanics. Candidates should have demonstrated research and teaching ability

in one or more of the following areas: rehabilitation engineering, injury prevention and functional anatomy. The candidate must have a strong background in biomechanics with a Ph.D. or an M.D. plus research training in a related area. Contact: J.S. Frank, PhD, Department of Kinesiology, University of Waterloo, Waterloo, Ontario, Canada, N2L 3G1, Fax:: (519)746-6776, Email: frank@healthy.uwaterloo.ca, <http://www.ahs.uwaterloo.ca/kin/kinhome.html>. *Priority consideration will be given to Canadian Citizens and Permanent Residents. This appointment is subject to the availability of funds.*

- ◆ The Graduate Program in Physical Therapy at Simmons College is offering a tenure-track position for an individual to teach in areas of biomechanics and applied kinesiology incorporating contemporary motor control theory. Contact: S. Goodgold-Edwards, ScD, PT, Graduate Physical Therapy, Simmons College, 300 The Fenway, Boston, MA 02115, Tel: (617)521-2632, Fax: (617)521-3137, Email: sgoodgold@vmsvax.simmons.edu

Postdoctoral Positions

- ◆ Two openings on an NIH training grant, funded by the National Center for Medical and Rehabilitation Research (NCMRR) for postdoctoral fellows, to work in the Sensory-Motor Performance program (SMPP) at the Rehabilitation Institute of Chicago. The RIC is an academic rehabilitation hospital, affiliated with, and located immediately adjacent to Northwestern University Medical School. The SMPP is a motor control and biomechanics laboratory, devoted to the study of human movement and its disturbances in neurologic and musculoskeletal disorders. Applicants should be US nationals or permanent residents, and should have completed all the requirements for the doctorate. Applicants in engineering sciences (BME, EE, ME), neuroscience, kinesiology, or relevant clinical disciplines are invited to apply. Contact: Z. Rymer, MD, PhD, Director of Research, room 1408, Rehabilitation Institute of Chicago, 345 East Superior, Chicago, Illinois, 60611 Tel: (312) 908-3381, Fax: (312) 908-2208, Email: zevric@casbah.acns.nwu.edu
- ◆ A three year post-doctoral position in bone biomechanics is available immediately in the Biomechanics Section of the Breech Research Laboratory of the Bone and Joint Center, Case

Western University/Henry Ford Health Sciences Center. Contact: D.P. Fyhrie, Ph.D., Section of Biomechanics, Breech Research Laboratory, Bone and Joint Center, E&R 2015, Henry Ford Hospital, 2799 W. Grand Blvd, Detroit, MI 48202, Tel: (313)876-7572, Fax: (313)876-8064.

- ◆ The Tissue Engineering group at the University of Washington's Center for Bioengineering is currently expanding its research program in "interfacial mechanics." As part of this expansion, a two-year postdoctoral fellowship will become available in June 1997. Interested researchers and students are encouraged to visit our web page (<http://weber.u.washington.edu/~bioewww/> follow Who's Who -> Core Faculty -> Joan Sanders) Contact S. Zachariah, Ctr. for Bioengineering, Univ. of Washington, Box 352255, Seattle, WA 98195, USA Tel: (206) 685 3488 Fax: (206) 543 6124, zach@limbs.bioeng.washington.edu
- ◆ Two postdoctoral positions are expected to become available in the Dept. Bioengineering at UC San Diego. The research project deals with investigations on the biomechanics, biomechanical regulation of signal transduction and gene expression, and extracellular matrix remodeling in aging, repair, and osteoarthritic human articular cartilage. Contact: R.L. Sah, M.D., Sc.D., University of California, San Diego, Department of Bioengineering, M.C. 0412, 9500 Gilman Dr., La Jolla, CA 92093, Tel: (619)534-0821, FAX: (619)534-6896, E-mail: rsah@ucsd.edu
- ◆ A postdoctoral position in the area of Ergonomics/Biomechanics is available at The Lawrence Livermore National Laboratory. Candidates should have strong backgrounds in ergonomics, computational biology, biomechanical engineering, or motion analysis. Contact: S. Burastero, PhD, Interdisciplinary Ergonomics Research Program, Health Services Department, LLNL, P.O. Box 808 (L-723), Livermore, CA 94550, Tel: (510)424-4506 or 423-9348, Fax: (510)423-7967, Email: burastero1@llnl.gov
- ◆ The School of Mechanical, Manufacturing and Medical Engineering, Queensland University of Technology, Brisbane, Queensland, Australia is offering a Postdoctoral Research Fellowship to work on a project undertaking functional assessment of gait in patients following total hip or total knee joint replacement surgery. Contact: M.

Pearcy, PhD, Email: m.pearcy@qut.edu.au or visit <http://www.qut.edu.au/pubs/04employ/96529.html>

◆ A postdoctoral position is available in the Biomechanics Laboratory of the Department of Orthopaedic Surgery at The University of Iowa. The candidate must be a US citizen and a recent recipient of a PhD in bioengineering or mechanical engineering (with a bioengineering emphasis). The research training will be in the area of total joint replacement. Contact: T.D. Brown, PhD, Orthopaedic Biomechanics Laboratory, 2432 Steindler Bldg, University of Iowa, Iowa City, IA, 52242, Tel: (319)335-7528, Fax: (319)335-7530, Email: tom-brown@uiowa.edu.

◆ The Division of Biological Materials at Northwestern University is seeking two postdoctoral fellows in >the areas of polymer chemistry, macromolecular science, or tissue engineering.. Qualified candidates must have a Ph.D. in either materials science and engineering, biomedical engineering, chemical engineering, or another relevant scientific field. Contact: K. E. Healy, Ph.D., Division of Biological Materials, Northwestern University, 311 East Chicago Avenue, Chicago, IL 60611-3008, Tel (312) 503-4735, Fax: (312) 503-2440, Email: kehealy@nwu.edu

◆ The Department of Orthopaedic Surgery and the Division of Bone and Mineral Diseases at Washington University in St. Louis invite applications for a post-doctoral fellowship in the general area of bone mechanics. Applicants must possess a Ph.D. and have expertise in either biomechanics or bone biology. Contact: M.J. Silva, Ph.D., Dept Orthopaedic Surgery, Washington University School of Medicine, One Barnes Hospital Plaza, St. Louis, MO 63110, Email: silvam@wudosis.wustl.edu

◆ A postgraduate Research Associate position is available in the Centre for Rehabilitation and Engineering Studies at the University of Newcastle. This is a 3 year position, the focus of which is to conduct research into biomechanically based methods for the clinical measurement of spasticity. Candidates should have degrees in Mechanical or Electrical Engineering or in Physics Applications Contact: G. Johnson, PhD, Centre for Rehabilitation and Engineering Studies, Stephenson Building, University of Newcastle, Newcastle upon the Tyne, NE1 7RU, UK, Tel: +44-191-222-6196, Fax: +44-191-222-8600,

Email: g.r.johnson@newcastle.ac.uk, [www: http://www.ncl.ac.uk/~ncrest/](http://www.ncl.ac.uk/~ncrest/)

◆ The Department of Physical Therapy and Exercise Science at the State University of New York at Buffalo has a post-doctoral position available for a qualified person interested in medical rehabilitation research. Contact: F. Cerny, SUNY at Buffalo, 410 Kimball, Tower, Buffalo, NY 14214, Tel:(716)829-2941 ext 208, Fax: (716)829-2034, Email: Cerny@acsu.buffalo.edu

Graduate Assistantships

Master's or Bachelor's Level

◆ The Center for Biomedical Engineering at Columbia is seeking applicants for graduate research assistant in the area of skeletal tissue bioengineering. This individual will pursue a Ph.D. degree in biomedical engineering and perform graduate research in cellular adaptation of bone by mechanical stimulation or micromechanics of bone tissue damage. The candidate should have B.S. in mechanical or biomedical engineering. An M.S. in mechanical or biomedical engineering will be preferred but not required. Contact: E. Guo, Ph.D., Center for Biomedical Engineering, 238 S.W. Mudd MC4703, Columbia University, New York, NY 10027, Tel:(212)854-6196, Fax:(212)854-3304, Email: exg1@columbia.edu, <http://www.columbia.edu/~exg1>

◆ The Children's Memorial Hospital Gait Analysis Laboratory in Chicago, Illinois has an opening for a full time kinesiologist or physical therapist with experience in biomechanics. Contact: S.Vankoski, MS, Gait Analysis Laboratory, Children's Memorial Hospital, Box #92, Chicago, IL 60614, Tel (773) 880-4248, Fax:(773) 871-0556, Email: svankoski@nwu.edu

◆ A position is available for an individual with a background in biomedical, mechanical or electrical engineering and a strong interest in the biomechanics of human movement. A Masters degree and experience in human movement analysis, orthopedic research, sports biomechanics and/or motor control are desirable. Contact: S. Tashman, Ph.D., Head, Motion Analysis Section, Bone and Joint Center, Department of Orthopaedics Henry Ford Hospital, ER2015, 2799 W. Grand Blvd.Detroit, MI 48202, Email: tashman@bjc.hfh.edu

◆ A position is available for a Sport Science Development Officer / Ph.D in Sport Biomechanics in the Scottish School of Sport

Studies. at the University of Strathclyde:
Candidates with an undergraduate or masters level qualification in biomechanics, bio-engineering or related discipline are invited to apply for this post (tenable for five years). The development officer will work with the National Governing Bodies of Sport to develop and deliver biomechanics aspects of sport science support programs. The successful candidate will also work towards the award of the degree of Ph.D. in a related area. Contact J. Watkins, PhD, Tel: 44-141-950-3718, Email: j.watkins@strath.ac.uk.

◆ Several graduate assistantships are anticipated to be available for individuals interested in a specialization of Applied Biomechanics. Current research interests include biomechanical bases of sport injury, functional activity in the elderly, pathological locomotion, and factors influencing control of balance and posture. Contact: C.W. Armstrong, PhD, Applied Biomechanics Lab, Health Education Center, University of Toledo, Toledo, Ohio 43606, Tel: (419-530-2753), Fax: (419)530-4759, Email: carmstr@uoft02.utoledo.edu

◆ The Department of Kinesiology at Indiana University is offering graduate assistantships for students applying to the Master of Science and Ph.D. programs in Biomechanics. The Biomechanics Laboratory specializes in Sport Biomechanics and the primary objective is to gain a better understanding of the cause-effect mechanisms of sports motions. Contact: P.R. Surburg, PhD, HPER 112, Indiana University, Bloomington, IN 47405, <http://ezinfo.ucs.indiana.edu/~dapena>

◆ Queensland University of technology School of Human Movement Studies in conjunction with Instron Australia Pty, Ltd is offering a research scholarship for a PhD study in clinical biomechanics focussing on the time dependant material properties of soft biological tissues. Applicants should have experience in materials testing techniques for biological tissues, a sound basis in the theory of strength of materials, and familiarity with the fundamental principles of both biological and engineering sciences. Contact: J. Smeathers, PhD, School of Human Movement Studies, Queensland University of Technology, Locked Bag 2 Red Hill QLD, 4059, Australia, Tel: + 61 7 3864 5828, Fax: +

61 7 3864 3980, Email: J.Smeathers@qut.edu.au, <http://www.qut.edu.au/>

◆ The Biomechanics Research Laboratory, in the Department of Exercise Science at the University of Southern California, Los Angeles has a research assistantship position available for the Fall of 1997. Students in the program have a variety of backgrounds including engineering, physical therapy, biology, computer science, exercise science, and mathematics. Contact: J.L. McNitt-Gray, Ph.D., Biomechanics Research Laboratory, Dept. of Exercise Science, University of Southern California, Los Angeles, CA 90089-0652, Tel:(213)740-2492, Fax:(213)740-7909, Email: mcnitt@usc.edu

◆ The Engineering Department at The University of Georgia is seeking individuals interested in working on graduate degrees in the area of biomechanics of Soft Tissue Injury and Repair. Contact: B. Verma, PhD, Graduate Coordinator, Driftmier Engineering Center, The University of Georgia, Athens, Ga 30602-4435, Email: gradprog@bae.uga.edu, <http://ice.bae.uga.edu/dept/positions.html#7>

◆ A research assistantship is available immediately for a PhD student in the area of muscle dynamics in neuromuscular prostheses. Candidates must be EU-citizen, non-Dutch, non-Danish. The program includes 3 years: University of Twente, Enschede, the Netherlands and 1 year at University of Aalborg, Aalborg, Denmark. Contact dr.ir. P.H. Veltink, Faculty of Electrical Engineering, University of Twente, P.O. Box 217, 7500 AE Enschede, the Netherlands. Tel. +31-53-4892765; Fax +31-53-4892287; Email: P.H.Veltink@el.utwente.nl; <http://www: http://www.utwente.nl/bmti/tmr.html>, <http://www-bio.el.utwente.nl/research/signals/fes.html>.

◆ The Motion Analysis Laboratory at the University of Virginia's Kluge Children's Rehabilitation Center has an opening for a Gait Lab Engineer. A Masters degree in Biomedical Engineering or equivalent is preferred. Previous gait analysis experience is required, as is a thorough knowledge of computer hardware and software. The ability to work well with physicians, therapists, students, parents and children is essential. Contact: R. Abramczyk, Gait Lab Engineer, Tel:(804) 982-0848, Email: rla5d@virginia.edu.

- ◆ A Graduate Teaching Assistantship is available at Northern Illinois University in the area of Biomechanics for the Academic Years 1997-1999. Contact: Y. Takei, PhD, Department of Physical Education, Anderson Hall 204, Northern Illinois University, DeKalb, IL 60115, Tel: (815) 753-3526; Fax: (815) 753-1413, Email: ytakei@niu.edu
- ◆ The Ergonomics Laboratory in The Department of Industrial Engineering at North Carolina State University has openings for four graduate research assistants for the Fall of 1997. These positions are intended for students interested in pursuing either a Master's or PhD in the area of occupational biomechanics. Contact: G. Mirka, PhD, Tel: (919) 515 6399, Email: mirka@eos.ncsu.edu or C. Sommerich, PhD, Tel: (919) 515 8614, Email: sommeric@eos.ncsu.edu, http://www.eos.ncsu.edu/eos/service/ie/research/ergolab_res/
- ◆ Graduate Assistantships are available in The School of Health and Human Performance at The University of Georgia for candidates interested in pursuing multidisciplinary research combining motor learning and biomechanics. Current areas of research include visual control of locomotion and kinematic changes during learning physical skills. Contact: P. DelRey, PhD, Tel: (706) 542-4183, Email: pdelrey@uga.cc.uga.edu, or K. Simpson, PhD Email: ksimpson@uga.cc.uga.edu

Industry, Health care, et al.

- ◆ The Orthopedic Biomechanics Laboratory, Mayo Foundation, Rochester, Minnesota has an opening for a full-time kinesiologist. The position requires a minimum of a bachelor's degree in kinesiology, biology, physical education, or related field, including course work in anatomy, physiology, kinesiology, exercise physiology, physics, mathematics, and computer science. Preference will be given to candidates with an advanced degree and previous experience performing motion analysis, including all aspects of hardware and software, experience managing data bases and data analysis/graphical display on a variety of computer platforms, such as PC, Macintosh, and UNIX/Silicon Graphics. Contact: K. Kerkhoff, Mayo Medical Center, Human Resources-OE 1, Rochester, Minnesota 55905, Fax: (507) 284-1445, Email: kerkhoff.kaine@mayo.edu
- ◆ The Biomechanics Laboratory at the National Institutes of Health has an available position for a

research/administrative assistant. The position is presently part-time (20 hours/week) but an immediate increase 40/week upon employment is anticipated. Contact: SJ. Stanhope, Ph.D., Biomechanics Laboratory, Building 10 Room 6s235, National Institutes of Health, 10 Center Drive MSC 1604, Bethesda MD 20892-1604, Tel: (301) 496-9891, Fax: (301) 480-9896, Email: Steven_Stanhope@NIH.GOV

- ◆ The Vermont Back Research Center, within the Department of Orthopaedics & Rehabilitation at the University of Vermont has an opening for a Ph.D.-level rehabilitation or ergonomic engineer, to plan, direct, and conduct biomechanical and rehabilitation engineering research to reduce back and spine injuries and disability. This position requires previous experience in research and professional publication and the ability to manage multiple projects and project teams. The position available is for a postdoctoral associate but carries the potential for becoming a research, non-tenure-track faculty position. Contact: E. Saganich, Administrator, Vermont Back Research Center, 1 So. Prospect Street, Burlington VT 05401
- ◆ The Orthopedic Biomechanics Laboratory, Mayo Foundation, Rochester, Minnesota has an opening for a full-time bioengineer. The position requires training in electrical engineering, mechanical engineering, bioengineering or computer science. Candidates should have a master's degree or a bachelor's degree with significant research experience. Contact; L. Romme Orthopedic Biomechanics Laboratory, Guggenheim 128, Mayo Foundation, Rochester, Minnesota 55905, Fax: (507) 284-5392, Email: romme.linda@mayo.edu
- ◆ Shriners Hospitals for Children, Springfield MA has an opening for a qualified, motivated individual as a Kinesiologist/Engineer in the Gait Analysis Laboratory. Candidates should have the equivalent of an M.S. in kinesiology, biomechanics, or related engineering field and at least two years of experience working in a clinical gait laboratory. Contact: J. Kocot, Director of Human Resources, Shriners Hospitals for Children, 516 Carew Street, Springfield, MA 01104-2396, Tel: (413) 735-1269, Email: ggorton@shrinerspfld.
- ◆ Hand Biomechanics Lab, Inc. is seeking a PHD in engineering/bioengineering with experience in the musculoskeletal system to perform biomechanical

studies related to new product development and basic science studies on the etiology of carpal tunnel syndrome. Contact: J. Agee, MD, Director, Hand Biomechanics Lab, Inc., 77 Scripps Drive, Suite 104, Sacramento, CA 95825, Tel: (916) 923-5073, Fax: (916) 920-2215, Email: 102101.3111@compuserve.com

♦ Sulzer Orthopedics Ltd. (Winterthur, Switzerland) is seeking a Testing Engineer to conduct and interpret static and dynamic tests of total hip replacements (i.e. fatigue testing and in-vitro testing). Qualified individuals should have a Bachelor's or Master's degree in Mechanical Engineering (Swiss: Dipl.Masch.Ing. HTL/ETH) with 2-3 years of work experience. Experience in technical writing is required with language skills in German, English and possibly French. Contact: M Buergi, Biomechanics 8116, Sulzer Orthopedics Ltd., P.O. Box 65, 8404 Winterthur, Switzerland, Tel. +41 (0)52 262 7110, Fax. +41 (0)52 262 0187, Email: Maja.Buergi@Sulzer.CH

♦ A sporting goods manufacturer is seeking a Laboratory Manager to oversee daily operation of Testing Laboratory. Candidates should have a B.S. and a minimum of 3 years experience within bicycle helmet and/or sports related product industry, knowledge of ISO 9001 and/or ISO Guide 25 compliance. Working knowledge of industry standards and practices in relation to helmets would be beneficial. Contact: G. Cramer, EFL International, 8777 East Via de Ventura, #300, Scottsdale, AZ 85258, Tel: (602)483-0496, extension 18, Fax: (602)483-2832, Email: greg@eflinternational.com

♦ A position is available for a biomechanical engineer with MS or PhD for medium size consulting engineering company in either in New Orleans, LA or Houston, TX. Experience in vehicle accident reconstruction, training, or related experience is desired. Contact: D. Mount at Engineering Personnel (800) 783-7533, or (504) 581-1400

♦ The Hand Biomechanics Laboratory, Inc. is seeking an individual with a PhD in engineering/bioengineering for biomechanical studies related to new product development and basic science studies on the etiology of carpal tunnel syndrome. Contact: J.M. Agee, M.D., Director, Hand Biomechanics Lab, Inc., 77 Scripps Drive, Suite 104, Sacramento, CA 95825

♦ A small but growing research firm is looking for an individual with a BS or MS in Biomedical/Mechanical Engineering with experience in orthopaedic device and GMP/ISO manufacturing. Experience in mechanical design, medical device development, in vivo testing, 3-D modeling, CNC machining, and ceramic processing is an advantage. Contact: N.R. Fox, BioMedical Enterprises, Inc., 14785 Omicron Drive, Suite 205, San Antonio, TX 78245, Tel: (210), Fax: 677-0355, Email: nancy@bme-tx.com

♦ A Phoenix, Arizona based engineering consultation company specializing in human dynamics, injury biomechanics, and accident reconstruction has an immediate opening for a M.S. or B.S. level engineer with strong written and oral communication skills. Qualified applicants will have a degree in Biomedical or Mechanical Engineering, with experience in computer graphics and instrumentation. Contact: J. Peles, Ph.D., 1505 East Weber Drive, Suite 104, Tempe, Arizona 85281, Fax: (602) 966-0126

Upcoming Meetings, Workshops, Etc.

April

16th Southern Biomedical Engineering Conference, 4-6 APRIL 1997, Biloxi, MS, Contact: J.D. Bumgardner, PhD or A.D. Puckett, PhD, Tel: (601) 325-3282 or (601)984-6170, Fax: (601)325-3853 or (601)984-6087, Email:

jbumgard@abe.msstate.edu or
puqua@fiona.umsmed.edu,
<http://abe.msstate.edu/abenews/bumgard.htm>

2nd Annual Meeting of the North American Society of Gait and Clinical Movement Analysis, 9-12 Apr, 1997, Chicago, Illinois, USA, Contact: Carolyn Moore, Bsc, Tel: (312)880-4248, Fax: (312)871-0556, Email: cmoore@nwu.edu.

34th Annual Rocky Mountain Bioengineering Symposium, 11-13 Apr 1997 Dayton, Ohio 45469 Contact Conference Chair, P.K. Bajpai, Ph.D., Dept. of Biology, University of Dayton, Dayton, Ohio 45469-2320, Email : Bajpai@neelix.Udayton.Edu)

International Conference on Rehabilitation Robotics, 14-15 Apr 1997, University of Bath, UK. Contact: Bath Institute of Medical Engineering, Wolfson Centre, Royal United Hospital, Bath BA1 3NG, UK, Tel: (44) 1225 824103, Fax (44) 1225 824111, Email

bime@bath.ac.uk,
<http://www.bath.ac.uk/~mps/bime/icorr97.htm>
**5th International Table Tennis Federation
Sports Science Congress, 22-25 April 1997,**
Lilleshall National Sports Centre, UK. Contact: I.
Maynard, PhD, School of Sports Studies, Chichester
Institute of H.E., College Lane, Chichester, West
Sussex, PO19 4PE, Tel:01243-816-295, Fax:01243-
536-011.

May

**3rd International Symposium on Computer
Methods in Biomechanics & Biomedical
Engineering, 7-10 May 1997, Barcelona, Spain,**
Contact: J. Middleton, PhD, Biomechanics and
Biomedical Engineering, Centre, Engineering
Building, University of Wales, Swansea, Singleton
Park, Swansea SA2 8PP, Wales, UK., Tel: (01792)
295514/295517. Fax: (01792)295514, Email:
J.Middleton@Swansea.ac.uk

**World Biomaterials Congress: 29 May-2 Jun
1997; Toronto, Ontario, Canada, Contact Congress
Canada, 191 Niagara Street, Toronto, Ontario,
Canada M5V 1C9; Tel. 416-860-1772 Fax 416-
860-0380**

June

**XII Annual International Conference on
Occupational Ergonomics and Safety
Conference, Washington, DC, June 1-4, 1997.**
Contact: B. Das, PhD, Technical University of Nova
Scotia, Industrial Engineering Department, PO Box
1000, Halifax, NS B3J 2X4, CANADA,
Tel:(902)420 7606, Fax(902)420 7858,
Email:dasb@tuns.ca

**13th International Symposium on "Multi-
sensory Control of Gait and Posture, 22-26
June, Paris, France, Contact: Groupe SPAT, 34
rue de l'Englise, 75015 Paris, France, Tel: +33 1
45 57 30 48, Fax: +33 1 45 54 23 86, Email:
spat@pobox.oleane.com.z**

**1st Smith & Nephew International Symposium
on Tissue Engineering and Biomaterials, 20-23
July 1997 University of York, Contact: IFAB
Communications, PO Box 373, York YO1 5YW,
UK, Tel:44 (0) 1904 432940, Fax:44 (0) 1904
433029, Email:biocomms@york.ac.uk**

**International Society of Biomechanics in
Sports/4th National Symposium on Teaching
Biomechanics, 21-25/25-29 June 1997, Texas
Woman's University, Denton, Tx, Contact: C.**

Ferguson, Office of Continuing Education, TWU,
PO Box 425649, Denton, Tx 76204-5649, Tel:
(817)898-3408 or Email F_Wilkerson@TWU.EDU
**1st International Conference on Cardiovascular
Medicine, Surgery, Science, and Mechanics, 6-9
June 1997, Washington, D.C., Contact: J.
Vossoughi, PhD, Tel: (202) 274-5175, Fax: (202)
274-5017, Email: vossoughi@msn.com**

**ASME Summer Bioengineering Meeting (Session
on Dynamics) 11-15 June 1997, Sun River Oregon.**
This meeting covers a broad range of topics, from
cellular biomechanics to clinical motion analysis.
Complete information on the conference can be
acquired from the Contact: Technical Program Chair
K.B. Chandran, PhD,
chandran@blue.weeg.uiowa.edu

July

**1st Smith & Nephew International Symposium
on Tissue Engineering and Biomaterials, 20-23
July 1997 University of York, Contact: IFAB
Communications, PO Box 373, York YO1 5YW,
UK, Tel:44 (0) 1904 432940, Fax:44 (0) 1904
433029, Email:biocomms@york.ac.uk**

August

**Joint Meeting of The Second Annual
Conference of the International Functional
Electrical Stimulation Society and the Fifth
Triennial Conference for Neural Prostheses:
Motor Systems V 16-21 Aug 1997, Simon Fraser
University, Burnaby, British Columbia, Canada,
Contact: D. Popovic, Professor, Faculty of
Electrical Engineering, University of Belgrade,
Bulevar revolucije 73, 11000 Belgrade, Yugoslavia,
Tel: 381-11-3248464, Fax: 381-11-3248681, E-
mail: IFESS97@ETF.BG.AC.YU**

**Symposium on Footwear Biomechanics,
International Society of Biomechanics Working
group on Functional Footwear, 21-23 Aug 1997,
Tokyo Metropolitan University, Tokyo, Japan.**
Detailed information and a call for papers can be
found at

<http://www.teleport.com/~biomech/tokyo97.html> or
contact: M. Shorten, PhD, Email:
biomech@teleport.com)

**XVIth Congress of the International Society of
Biomechanics, 25-29 Aug 1997, Tokyo, Japan.**
Contact Dr. S. Fukushima, General Secretary, XVIth
ISB, Tokyo Congress, Dept. Life Sciences,
University of Tokyo, Komaba 3-8-1, Meguro 153,
Japan. Tel & Fax: +81-3-5454-9494, E-
mail:ISB97@idaten.c.u-tokyo.ac.jp.

September

5th International Scientific Congress of the International Association of Sport Kinetics. 3-6 September 1997, Magdeburg, Germany. Contact: K. Witte, PhD, Institute of Sport Science, Otto-von-Guericke-University Magdeburg, Stresemannstr. 23, 39104 Magdeburg, Germany, Fax: (0)391-6714705.
74th Annual Conference of the American Congress of Rehabilitation Medicine, 12-14 Sep 1997, Boston, MA, Contact: American Congress of Rehabilitation Medicine, 4700 W. Lake Avenue, Glenview, IL 60025-1485, Tel: (847) 375-4725, Fax: (847) 375-4777, Email: info@acrm.org, <http://www.acrm.org/>
World Congress on Medical Physics and Biomedical Engineering: 14-19 September, 1997 Nice (French Riviera, [very nice]), France. Contact Didier Geiger, Conference Co-Chair (GEIGER@UNIV-PARIS12.FR), Pierre Aletti, Conference Co-Chair (ALETTI@NANCY.FNCLCC.FR), GENERAL SECRETARY :48, rue de la Procession, F 75724 PARIS CEDEX 15 (FRANCE), Tel : +33 1 44 49 60 60, Fax : +33 1 44 49 60 44, E-mail : NICE97@UNIV-PARIS12.FR.

21st Annual Meeting of the American Society of Biomechanics, 17-20 Sep 1997, Clemson University, Clemson, South Carolina, Contact V.M. Gharapuray, PhD or R.L. Dooley, PhD, Department of Bioengineering, Clemson University, 501 Rhodes Research Center, Clemson, SC 29634-0905, Tel: (864) 656-3051, Fax: (864) 656-4466, Email: vasanti@ces.clemson.edu

(1) International Congress on Motion Systems, (2) Biomechanic Workshop of the Studygroup "Morphology" of the Deutschen Zoologischen Gesellschaft, (3) Workshop of the Society for Technical Biology and Bionics (GTBB) 29-30 September 1997, Jena, Germany, Contact: Marion Gerhardt, Prof. Dr. R. Blickenrieder, Friedrich-Schiller Universität, Jena, Institut fuer Sportwissenschaft, Seidelstr. 20, 07749 Jena, Germany, Tel: +49 3641 630100, Fax: +49 3641 630109, Email: Marion.Gerhardt@uni.jena.de, <http://www.uni.jena.de/bewsys/start.html>,

November

Symposium on Dynamics, Control, and Design of Biomechanical Systems, 16-21 Nov 1997. Contact: Y. Hurmuzlu, PhD, Dept. Mechanical Engineering, Southern Methodist University, Dallas,

Texas 75275 USA, Tel: (214)768-3498, Fax: (214)768-1473, Email: hurmuzlu@seas.smu.edu

1998

2nd Australasian Biomechanics Conference, 28-30 Jan 1998, The University of Auckland, Auckland, New Zealand, Contact: P.A. Hume, PhD, Sport & Exercise Science Department, University of Auckland - Tamaki Campus, Private Bag 92019, Auckland, New Zealand, Phone (649)373 7599 ext 6859, Fax (649)373 7043, Email: p.hume@auckland.ac.nz

6th European Congress on Research in Rehabilitation, 31 May-4 June, 1998, Berlin, Germany, Contact: Congress Secretary ECRR-98, H. Kirsten, c/o BAR, Walter-Kolb Str. 9-11, D-60594 Frankfurt/M, Germany, Tel: ++49-69-605018, Fax: ++49-69-605018-37.

International Research Society of Spinal Deformities, 28 Jun - 1 Jul 1998, Burlington, Vermont, Contact: I.A. Stokes, PhD, University of Vermont, Department of Orthopaedics and Rehabilitation, Burlington, VT 05405-0084, USA, e-mail: irssd@med.uvm.edu, <http://salus.med.uvm.edu/~irssd/1998.htm>

8th International Symposium of Biomechanics and Medicine in Swimming, 28 Jun-2 Jul, 1998, Jyväskylä, Finland, Contact the Symposium secretariat, Email: pitkanen@jyu.fi. to get

Fifth International Symposium on the 3-D analysis of Human Motion, 2-5 Jul 1998, Chattanooga, Tennessee, Contact: M. Whittle, PhD, The University of Tennessee at Chattanooga, Michael-Whittle@utc.edu, <http://www.utc.edu/Human-Movement>

Symposium of the International Society of Biomechanics in Sports. 21-25 July, 1998. University of Konstanz (Germany). Contact ISBS'98 Secretariat, Department of Sports Science, Lehrstuhl Riehle, P.O.Box 5560 D30, 78434 Konstanz / Germany, Tel: +49-7531-883565, Fax: +49-7531-884221, Email: isbs98@uni-konstanz.de,

The Third World Congress of Biomechanics: 2-8 Aug 1998, Hokkaido University, Sapporo, Japan; Contact K. Hayashi, PhD, Biomechanics Laboratory, Department of Mechanical Engineering, Faculty of Engineering Science, Osaka University, Toyonaka, Osaka 560, Japan; Tel: +81-8-850-6170, Fax: +81-8-850-6171

The Third North American Congress on Biomechanics, 14-18 Aug 1998, University of

Waterloo, Waterloo, Ontario, Canada. Contact: S. McGill, Ph.D., host chair, mcgill@healthy.uwaterloo.ca.

International Conference on Weightlifting and Strength Training (in conjunction with the World Weightlifting Championships), November 10-12, 1998, Lahti, Finland, Contact: Ms Pirjo-Leena Pitkanen, Conference Coordinator, ConFinnia Ltd, P.O. Box 35, FIN-40351 Jyväskylä, Finland, Tel: +358-14-603662, Fax +358-14-603727, Email: pitkanen@jyu.fi, <http://www.jyu.fi/wlconference/>
3rd Combined Meeting of Orthopaedic Research Societies of USA, Canada, Europe and Japan, 28-30 Sep 1998, Contact: Hayato Hirotani, MD, Shigetomi Health Care Group, 1-1521, Shikenyu, Moriyamaku, Nagoya, Japan 463. Tel: +81-52-776-2501, Fax: +81-52-776-2508.

3rd Interdisciplinary World Congress on Low Back- and Pelvic Pain, 19-21 Nov, 1998, Vienna, Austria, Contact: in Europe: European Conference Organizers, P.O.Box 4334, 3006 AH Rotterdam, The Netherlands. Phone +31 - 10- 4133287. Telefax + 31 - 10 - 4148059. Email:

SJCECO@WorldAccess.NL; in the U.S.: University of California, San Diego, Office of Continuing Medical Education, 9500 Gilman Drive, 0617, La Jolla, California 92093-0617, U.S.A. Tel:(619)534 3940. Fax:(619)534 7672

Places to "Go"

- ◆ ISB '97:
<http://idaten.c.u-Tokyo.ac.jp/ISB97/isb97.html>
- ◆ NACOB 98
<http://www.ahs.uwaterloo.ca/nacob98/>
- ◆ A new site devoted to sport and exercise science
<http://www.sportsci.org>
- ◆ Ergonomics Australia On-Line
<http://www.uq.edu.au/eaol/>
- ◆ Funding opportunities in aging: American Federation for Aging Research
<http://www.afar.org>

This Month's New Society

The *Occupational Injury Prevention and Rehabilitation Society* (OIPRS) is a newly formed multi-disciplinary society. The Society seeks: To pursue certification and develop standards and terminology.

To provide educational opportunities for individual and organizational providers through conferences, networking and publications.

To influence proactively the direction of the field through networking, with the assistance of consumers of services.

To promote occupational injury prevention and rehabilitation through advancement of the field and identification of trends and research needs.

For more information about the Society and membership call Mary Peters at (913) 438-8400 or Margot Miller at (218) 728-6455 USA.

If you wish upon a Star

THE NOVEL AWARD FOR FOOT BIOMECHANICS

The International Society of Biomechanics (ISB) has received a gift of \$10,000 from NOVEL GmbH for a competition to attract outstanding papers in the area of Foot Biomechanics. All individuals (including non-members of the ISB) are invited to submit full manuscripts of original work in this area describing research which has not been previously published (prior abstract publication is permissible). The closing date for submission is May 15, 1997. The winner will be notified by July 15, 1997, and the prize will be awarded at the XVI Congress of the ISB in Tokyo, Japan (August 25-29, 1997). Entries should be sent to:

Savio L. Y. Woo, Ph.D.
Chair, ISB Awards Committee
Department of Orthopaedic Surgery
Musculoskeletal Research Center
University of Pittsburgh
Suite 1010 Kaufmann Bldg.
3471 5th Avenue
Pittsburgh, PA 15213 USA

"Here's what happened at the..."

5th Annual Meeting of the European Society for Movement Analysis in Children, Dublin, Ireland, 12 - 14 September 1996.

Around 250 people attended the conference from various Institutions throughout the world. There were representatives from Australia, Belgium, Brazil, Canada, England, Finland, Germany, Japan, Ireland, and various other countries, particularly the United States. The meeting started on Thursday morning with a formal opening and a keynote address by Dr James Gage from the Gillette Children's Hospital, in Minnesota. This presentation was excellent and was primarily concerned with the assessment of

pathological gait in cerebral palsy children. An interesting concept was presented in the fact that his research had developed a 'normality' scale for statistical analysis which allowed effective surgical techniques to be assessed by presenting the results of the subject on this scale both pre and post operation. What was also interesting was that Jim Gage outlined the cost of keeping patients on this kind of treatment in America Hospitals and for a particularly complicated case of cerebral palsy assessment and treatment there was an estimated cost of around \$90,000 for a forty day stay in hospital. The significant implications of trying to get the children through the treatment and out of Hospital was fundamentally clear.

Rob Kleissen, from Roessingh Research and Development, Enschede, presented a keynote about the electronic highway perspectives for clinical movement analysis. This talk was an outstanding talk which showed some very interesting pathways forward for the future. One example was the use of video conferencing where by Dr Gage gave an assessment of a patient in Holland actually in the conference theatre and he saw on line video presented over the screen in the lecture theatre. The video of a child with cerebral palsy was shown and then Dr Gage talked to the person on the other end of the video conference and actually gave a clinical assessment. This was impressive, but one of the problems must be the medical legal side of this. However, it did demonstrate the significance and value of use of the internet and video conferencing facilities.

Following this talk there were papers presenting aspects of Gait evaluation and a number of talks were concerned with pathology and disability and there were not really many looking at the work with normals. There was a paper by Thompson on "How long does it take to establish a repeatable Gait cycle" which was quite interesting in the fact that it presented some of the problems associated with assessment of normals. Next, Roy Davis from Cincinnati, presented some excellent work and some detailed outlines of changes in Gait pattern over time in children with Cerebral Palsy. His work has always been well received by this group and it was particularly well presented. The afternoon, saw a keynote address by Steven Koop again from the Gillette Children's Hospital in Minnesota. This talk presented ten challenges for the group (the European Society)

namely: more work on normals, broaden the spectrum for testing and be prepared to standardise. Finally, in addition to the lectures there was an extensive industrial exhibition with several presentations from Vicon, Coda, Motion Analysis, Mac Reflex and many other clinically gait related companies.

Generally it was a very useful conference to attend, and quite a relatively inexpensive one. The journal Gait and Posture will publish the abstracts which will be a useful source of reference for anyone working in the field of movement analysis in children.

Thanks to Paul N. Grimshaw, University of Exeter, U.K. for this submission

The Poet's Corner

A poll conducted among INFOCUS readers had established "waka" as the proper pronunciation for the angle-bracket characters < and >, though some readers held out resolutely for "norkies." The text of the poem follows:

```
<|*"#
^"$$-
!*=@$_
%*<~#4
&[.]
```

|{,,SYSTEM HALTED

The poem can only be appreciated by reading it aloud, to wit:

Waka waka bang splat tick tick hash,
Caret quote back-tick dollar dollar dash,
Bang splat equal at dollar under-score,
Percent splat waka waka tilde number four,
Ampersand bracket bracket dot dot slash,
Vertical-bar curly-bracket comma comma CRASH.

Thanks to Alan Litsky of The Ohio State University, AND Editorial Board member of the Annals of Improbable Results for this submission

Proceedings Available

The proceedings of the 1st International Congress on Skiing and Science, held in January 1996 in St. Christoph (Austria) have been published and can be ordered at E & FN Spon (Chapman and Hall), or at our Institute respectively. The price is 52 British pounds. The proceedings include the papers of 6 keynote lectures and 44 oral presentations from the

fields Biomechanics of Skiing, Fitness Testing and Training in Skiing, Movement Control and Psychology in Skiing, Physiology of Skiing and Sociology of Skiing.

To Order, write:

Institute for Sport Sciences
Dr. Hermann Schwameder
Akademiestr. 26
A-5020 Salzburg
Tel: ++43-662-8044-4850
Fax: ++43-662-8044-614
Email: hermann.schwameder@sbg.ac.at

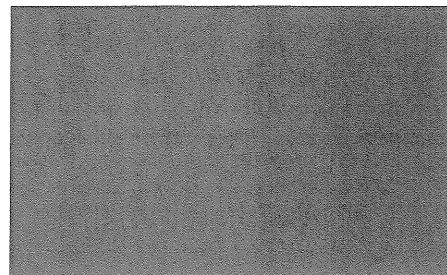
Déjà vu, all over again

In the last Newsletter, a submission by Paul Devita included a digital image of a photograph called "The Magnanimous Cuckold". It's likely that Paul himself felt cuckolded when it became obvious that the digital image he submitted underwent something of a metamorphosis during printing and copying (oops?!). Well, fairness dictates that we "right this wrong". Therefore, Editorial Staff hopes that the following image makes the whole thing a lot clearer.:

Latest entry to the "I Wish I Hadn't Said That" Collection

"As long as the postmaster of our university does not interfere I can send copies of the article to anyone interested in the topic." By Volker Schlegel, prior to having received 1000's of messages in response to his Email posting on Biomch-L, "

Thanks to Brian Davis, Cleveland, Ohio, for this submission



The Thesis Exchange

Editor's note: This newsletter component provides a vehicle through which graduate students can disseminate, reasonably rapidly, the results of their Masters and Doctoral studies to the biomechanics community (see detailed instructions on next page). These abstracts are intended also to provide impetus for interactive discussions on these topics among members and, thus, may provide valuable feedback to the author. Comments may be directed to the newsletter Editor for inclusion in future issues. Naturally, the Newsletter Editor assumes no responsibility for being unilingual.

THEORETICAL AND EXPERIMENTAL APPROACHES OF PLANTARFLEXION ISOMETRIC MOMENT IN HUMANS

Pierre Legreneur
Groupe Analyse du Mouvement,
UFR-STAPS, Université de Bourgogne
BP 138, 21004 Dijon Cedex, France.
Supervised: Professors Jacques Van Hoecke and Bernard Morlon.

C.R.I.S. - Laboratoire de la Performance, Université Claude Bernard, Lyon I, 27-29, Bd du 11 Novembre 1918, 69622 Villeurbanne Cedex, France.

The main purpose of this work was to investigate, inside a musculotendon actuator, how the isometric force developed by a muscular fibre was transferred to tendon insertion on skeleton. Moreover, we evaluated if this force developed by a musculotendon actuator at a joint was able to represent the whole force developed by all systems crossing this joint. A theoretical model of the isometric force developed by a musculotendon actuator has been developed. This model was taken into account (i) the musculotendon architecture, (ii) its neural excitation level and (iii) its corresponding musculoskeletal system. The simulation of the model showed that, at maximal neural excitation level, tendon compliance and pennation angle tended to minimise the muscular fibre

length variations induced by joint angle modifications. This function is regulated, with musculotendon lengthening, by pennation angle increasing or tendon lengthening. As a result, an increase of the operative range of the system was observed. Thus, the actuator was able to develop active force at shorter lengths (pennation angle effect). Moreover, a shift of its optimal length towards greater lengths was obtained (tendon compliance effect). In order to understand the complex mechanisms associated to neural excitation level modification, two analysis level have been considered. The first one was the simple system UM_T defined by one motor unit inserted in series with an unique tendon unit. The simulation of this simple model, under various neural excitation levels, pointed out interactions between tendon length, fibre length and neural excitation level. Thus, a shift of the UM_T system optimal length towards greater lengths was obtained with neural excitation increasing. The second analysis level was the whole musculotendon system, defined as many UM_T systems arranged in parallel. The simulation results of this complex model showed that neural excitation organisation induced a length heterogeneity of muscular fibres. However, the force-length relationship of the musculotendon actuator and the UM_T system presented similar properties, i.e. a shift of the system optimal length towards greater lengths. Aimed to validate the moment-joint angle relationship predicted by the model applied to the soleus actuator, we compared this relation to the one experimentally obtained at the ankle in maximal activation conditions. The activation patterns of the three chiefs of the triceps surae have been controlled by their surface electromyograms. Using various functional assumptions, we were able to deduct the experimental isometric moment developed by the soleus and to show that the experimental and theoretical moment-angle relationship were similar. The mechanical and electromyographical results obtained in maximal and sub-maximal isometric conditions permitted to examine the roles of the bi-articular gastrocnemii actuators. It seemed that, while they acted as plantarflexor actuators, the recruitments of their neuro-muscular compartments were regulated by knee joint angle position. Thus, distal compartments, acting as knee extensors, could be recruited in order to inhibit the knee flexor function of the proximal compartments of the gastrocnemii.

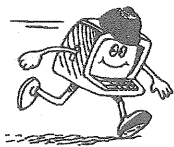
CONTRIBUTION TO THE DESIGN OF BASKETBALL SHOES: BIOMECHANICAL ANALYSIS OF THE INFLUENCE OF FOOTWEAR ON VERTICAL JUMP AND ON PERFORMANCE: EPIDEMIOLOGICAL ASPECTS.

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In part 1, characteristics of basketball players were studied (including personal, technical aspects, most frequent injuries, preferences and needs regarding their footwear). In part 2, the biomechanical effects of basketball footwear were studied, focusing on injury prevention and motor performance. In part 1, a questionnaire was administered among basketball players of the province of Valencia (n= 1008). For the biomechanical study, the following tests were made with test subjects: shock absorption when landing after a jump, by means of force plates and skin mounted accelerometers; rearfoot movements during landing, by means of high speed cinematography; maximum vertical jump and obstacle course performance, by means of electronic chronometer systems. The results allow to confirm that the most frequent injury suffered by basketball players is ankle sprain. Regarding footwear, the most important criteria for the players were shock absorption, stability and flexibility. The biomechanical analysis revealed that increased ankle support increased forefoot impact levels, as a consequence of the range of movement limitation in ankle dorsi-flexion and knee flexion. The high top and heel counter were found to be effective elements for reducing maximum eversion; however a hollow midsole is only effective for low support shoes. A lace system was not found to produce any effect in the movements studied. Regarding performance in vertical jump and in obstacle course, the use of high support shoes reduces motor performance. From the results obtained, a series of recommendations are given for the design, construction and selection that allow for the improvement of the characteristics of footwear for basketball and help the players in the choice of their footwear.



Birdy's Corner

FIR or IIR?—That is the Question

QB, what type of digital filter do you use on your data? "I use a recursive Butterworth". Is this a causal LTI FIR or IIR filter? "You should know that all recursive filters are IIR and I don't know what causal LTI means; but, this filter does seem to work quite well for removing noise in my data." Why not use a noncausal FIR smoother on your data? "IIR filters are fast, available in many signal processing packages and filtering does smooth the data, so why should I use an FIR?" Umph... perhaps we had better take a little closer look at digital filtering.

We must nearly always apply some sort of digital filtering to measured data, even when analog or digital filters are included in the measurement equipment. There are many types of digital filters and forms of implementation (e.g. physical realizations). Here, we will consider only the algorithms for causal/noncausal, linear time-invariant (LTI) in the two classes: FIR (finite impulse response) and IIR (infinite impulse response). Both classes are used to extract that part of a measured signal which we are most interested in analyzing, or attenuation of the unwanted. Filtering and smoothing are often used synonymously; but, in the context of signal processing they are different. Simply stated, filtering refers to using the past and present (current) measurements to estimate the present measurement, while smoothing uses the past, present and future to estimate the present measurement. Actually, there are different types of smoothing (see a textbook which discusses Kalman filtering and smoothing). So what would you call filters which discard the past and are based on only the present and future measurements, QB? "Sheer folly, of course!"

LTI Causal Systems

What is a LTI system? First let's examine the "L" of LTI. A linear system is one that satisfies the *superposition* principle. That is, a system H is linear if and only if

$$H(ax_n + by_n) = aH(x_n) + bH(y_n) \quad (1)$$

for any input sequences x_n, y_n and constants a, b . We can break this down into two separate relations which are often used for the definition of a linear operator. Suppose that $b = 0$, then (1) reduces to

$$H(ax_n) = aH(x_n)$$

and further if we define

$$v_n = H(x_n)$$

then the response of H to ax_n is just av_n . That is, scaling the input will scale the corresponding output which is the *multiplicative* or *scaling property* of linearity. And for the

second relationship let $a = b = 1$ in (1) to obtain

$$\begin{aligned} H(x_n + y_n) &= H(x_n) + H(y_n) \\ &= v_n + w_n. \end{aligned}$$

This is called, the *additivity property* for obvious reasons. For the more adventurous you might look at the difference between an affine system and a linear system. Now for the "TI" of LTI. A system H is called time-invariant if its transformation (or mapping) characteristics do not change with time. More precisely, a relaxed (transient effects died out) system H is time-invariant if and only if

$$x_n \xrightarrow{H} v_n \quad \text{and} \quad x_{n-k} \xrightarrow{H} v_{n-k}$$

for every input signal x_n and every time shift (lag) k . These definitions also suggest a simple procedure for testing LTI (try it on one of your signal processing step). A causal system produces an output that is dependent on only current and past inputs and past outputs. Causality can also be thought of as a condition of physical realizability for a digital filter. Before going any further let's stop, take a breath, and look at a simple example to better understand these rather abstract definitions. Assume that we have a data sequence, $\{x_n, n = 0, 1, \dots, N-1\}$, of uniformly spaced samples (fixed sample rate) and apply

$$y_n = \frac{1}{3}(x_{n-1} + x_n + x_{n+1}), \quad n = 0, 1, \dots, N-1 \quad (2)$$

to the data sequence — a moving-average smoother. Smoother, because of the term x_{n+1} which is a sample in the future with respect to the value being smoothed at sample- n . Moving-average, because a "window" which spans 3-samples moves (slides) over the data sequence and the output (at the center of the window) comes from the average of these samples (weight of $1/3$ for each sample in the window). "But what about y_0 and y_{N-1} ?" Good question QB. There are two ways of dealing with this problem: 1) output only $\{y_1, y_2, \dots, y_{N-2}\}$, i.e., throw away the first and last samples and obtain $(N-2)$ -smoothed samples or, 2) extend (extrapolate) the data on both ends (estimate x_{-1}, x_N) and obtain N -smoothed samples. Note, in both cases (2) is a noncausal transformation since the output at any sample always depends on a sample in the future and it is not physically realizable (using passive electronic components). It is also LTI, since (2) satisfies the superposition principle (verify this for yourself) and the weights (filter coefficients) do not change with time. It can also be shown that this is a low-pass type with zero-phase shift; i.e., the output is not time-shifted with respect to the input. It is almost always safe to assume that digital smoothers are noncausal digital filters and will have zero-phase shift since the weights used are usually symmetrical with respect to the center of the window. There is another form of smoothing that can produce zero-phase shift with causal filters. Suppose we apply the causal transformation

$$y_n = \frac{1}{2}(x_{n-1} + x_n), \quad n = 0, 1, \dots, N-1$$

to our data sequence (forward pass) and then run the same filter over the data in reverse order (backward pass). Note,

one could run the filter backward over the already forward filtered data or backward over the unfiltered data and then combine the forward and backward results (e.g. average forward-backward samples) – try these two different methods and compare the results. Forward-backward filtering is commonly used for data smoothing in signal processing and can also give zero-phase shift. Strictly speaking, this is noncausal smoothing; even though we are using causal digital filters. The catch is that our backward pass is noncausal, since we are filtering using the present and future values – so QB, you might reconsider your earlier answer “Sheer folly, of course.” Also, you might find it interesting to know that some time series are time irreversible! That is, the statistical characteristics of these time series are not the same when time is reversed.

Digital Filters

The general equations for Causal LTI digital filtering algorithms that operate on an input data sequence of x_n 's to produce an output sequence of y_n 's are now given (it can be instructive to compare these equations to those used in convolution). The IIR algorithm is defined by

$$y_n = \sum_{k=0}^{q-1} c_k x_{n-k} + \sum_{k=1}^p b_k y_{n-k}$$

and uses linear feedback to combine the weighted sum over the history of the input (the first sum) with the weighted sum over the history of the output (the second sum). The FIR algorithm is just a feedback deprived IIR; i.e., the b_k 's are all zero,

$$y_n = \sum_{k=0}^{q-1} c_k x_{n-k}. \quad (3)$$

The terms “finite impulse response” and “infinite impulse response” refer to the duration of the response to an impulsive input. The FIR's response will go to zero in finite time, while the IIR's response, sustained by feedback, will continue forever (albeit, it can decay exponentially to zero). The term recursive comes from the feedback part in the IIR filter; i.e., the outputs depend on previous outputs. Suppose we pick all of the weights (c_k 's) to be equal to $1/q$ in (3), then

$$y_n = \frac{1}{q} \sum_{k=0}^{q-1} x_{n-k}$$

is just the moving-average of the present and $(q-1)$ -past inputs and is clearly nonrecursive. But, this can be rewritten as,

$$y_n = y_{n-1} + \frac{1}{q}(x_n - x_{n-q})$$

which is easy to derive (try it). The point is that we have changed a nonrecursive FIR into a recursive FIR. In fact, every FIR filter can be realized both nonrecursively and recursively. Contrary to popular opinion and to your answer QB, all recursive filters are not IIR. Thus, FIR and IIR distinguish between two types of LTI systems while,

recursive and nonrecursive distinguish between implementations. “Ok, but why not always use IIRs since they are a generalization of FIRs?” Intuitively, this seems reasonable QB; but, unfortunately the underlying theory of dynamic systems reveals that the feedback mechanism in IIRs can cause several problems which are not present in FIRs. One of the most recent findings comes from the area of nonlinear dynamics (see the journal - *Physica D*) where it has been shown both theoretically and experimentally that IIRs can change the embedding dimension of a time series containing chaos; that's right, IIRs can alter the underlying dynamics! On the other hand, it was also shown that FIRs do not change the embedding dimension. In addition, IIRs when compared to FIRs suffer from: 1) nonlinear phase, 2) lack of flexibility in meeting special amplitude response requirements, and 3) potential instability. However, in all fairness IIR filters are relatively easy to design using analog filter techniques, are of low complexity (fewer coefficients than FIR for the same quality of filtering which mean faster execution), and can be stabilized using good design techniques. Although, the algorithms for IIRs and FIRs are relatively easy to implement in software, the determination of their weighting coefficients for a given output requirement can be quite difficult to implement. You may also notice QB that IIR, FIR filters are close relatives of ARMA, MA time-series models— indeed this should come as no surprise since MA means moving-average and AR autoregressive (recursive).

Epilogue

Of course, I have barely scratched the surface of digital filtering – one of the fundamental steps in the processing of biomechanical data. I have said nothing about nonlinear filters, nor have I mentioned the Sampling Theorem and digital transform theory which allow us to move between the time and frequency domains. Also, the actual design of digital filters is another interesting and important topic, although there are now many signal processing packages which relieve us from much of the drudgery of digital filter design and testing. Some noteworthy examples are the signal processing tools available with *MatLab* and *Mathematica*. And when you have nothing better to do, read a book on digital signal processing – one of my favorites is Boaz Porat's *A Course in Digital Signal Processing* – it has nearly everything you always wanted to know about digital filters (including *MatLab* code for almost every algorithm described) and even more.

I have written a somewhat complex but efficient Pascal program for digital filtering that is available via FTP (<ftp://ki.se/pub/outgoing/birdy/ISB05.ZIP>). This is a rather general FIR smoother package (uses Kaiser window function) that allows the user to specify: sample rate, critical frequencies, attenuations in stopbands and passbands, and boundary conditions (data extensions at the ends). And remember

- Choose your digital filter carefully
- IIR filters can change the dynamics of data

Th-th-tha-that's all folks!

STUDENT GROUP CONTRIBUTION

Have you been successful in achieving the best upgrade path to the most powerful and satisfying computer of all? According to advice from AnNet Hacker, your upgrade path should have been:

- Pocket calculator
- Commodore Pet / Apple II / TRS 80 / Commodore 64 / Timex Sinclair (any one)
- IBM PC
- Apple Macintosh
- Fastest workstation of the time (HP, DEC, IBM, SGI: personal choice)
- Minicomputer (HP, DEC, IBM, SGI: personal choice)
- Mainframe (IBM, Cray, DEC: personal choice)

And then you should have reached the pinnacle of modern computing facilities, namely:

* GRADUATE STUDENTS *

Yes, you just sit back and do all of your computing through lowly graduate students. Imagine the advantages:

- Multi-processing, with as many processes as you have students. You can easily add more power by promising more desperate undergrads that they can indeed escape college through your guidance. Special student units can even handle several tasks *on their own*.
- Full voice recognition interface. Never touch a keyboard or mouse again. Just mumble commands and they *will* be understood (or else!).
- No hardware upgrades and no installation required. Every student comes complete with all hardware necessary. Never again fry a chip or \$10,000 board by improper installation! Just sit that sniveling student at a desk, give it writing utensils (making sure to point out which is the dangerous end) and off it goes.
- Low maintenance. Remember when that hard disk crashed in your Beta 9900, causing all of your work to go the great bit bucket in the sky? This won't happen with grad. students. All that is required is that you give them a good *whack!* on the head when they are acting up, and they will run good as new.

- Abuse module. Imagine yelling expletives at your computer. Doesn't work too well, because your machine just sits there and ignores you. Through the grad. student abuse module you can put the fear of god in them, and get results to boot!
- Built-in lifetime. Remember that awful feeling two years after you bought your GigaPlutz mainframe when the new faculty member on the block sneered at you because his FeelyWup workstation could compute rings around your dinosaur? This doesn't happen with grad. students. When they start wearing and losing productivity, simply give them the PhD and boot them out onto the street to fend for themselves. Out of sight, out of mind!
- Cheap fuel: students run on Coca Cola (or the high-octane equivalent -- Jolt Cola) and typically consume hot spicy chinese dishes, cheap taco substitutes, or completely synthetic macaroni replacements. It is entirely unnecessary to plug the student into the wall socket (although this does get them going a little faster from time to time).
- Expansion options. If your grad. students don't seem to be performing too well, consider adding a handy system manager or software engineer upgrade. These guys are guaranteed to require even less than a student, and typically establish permanent residence in the computer room. You'll never know they are around! (Which you certainly can't say for an AXZ3000-69 150 gigahertz space-heater sitting on your desk with its ten noisy fans....). [Note however that the engineering department still hasn't worked out some of the idiosyncratic bugs in these expansion options, such as incessant muttering at nobody in particular, occasionally screaming at your grad. students, and posting ridiculous messages on world-wide bulletin boards.]

So forget your Babbage Engines and abacuses (abaci?) and PortaBooks and DEK 666-3D's and all that other silicon garbage. The wave of the future is in wetware, so invest in graduate students today! You'll never look back!

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EDITOR'S NOTE

The ISB Newsletter is published quarterly: February-March (Spring); May-June (Summer); August-September (Autumn), and November-December (Winter). Deadlines for material and articles are the first day of each first named month, and the Newsletter is mailed to members early in the second named month. Members are encouraged to submit just about anything they would like to relate to the biomechanics community. The content of the Newsletter does not necessarily reflect the philosophy and opinions of the ISB but may reflect the mood of the Editor. Naturally, serious items such as *Letters*, *Special Articles*, *Affiliate Society News*, *Laboratory Features*, *Reports*, or *Announcements of Meetings, Conferences, and Jobs Available*, *Reviews* of relevant conferences and other serious biomechanics-related information is desirable. *Thesis Abstracts* can be published. Thesis abstracts should provide an Introduction that includes the rationale and hypotheses of the study, description of the methods, the key results, and important conclusions. The title of the work student's name, department and institution, the degree earned and the conferring institution and supervisor's name should also be provided. In special circumstances a complete edition of the Newsletter can be devoted to the publishing of a Society's "Proceedings". Material may be submitted electronically or on a computer disk as a text-only file, and in English.

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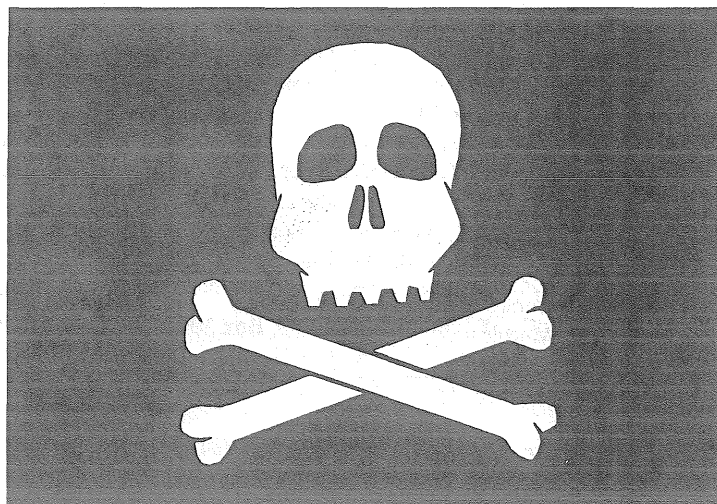
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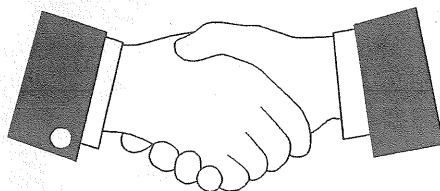
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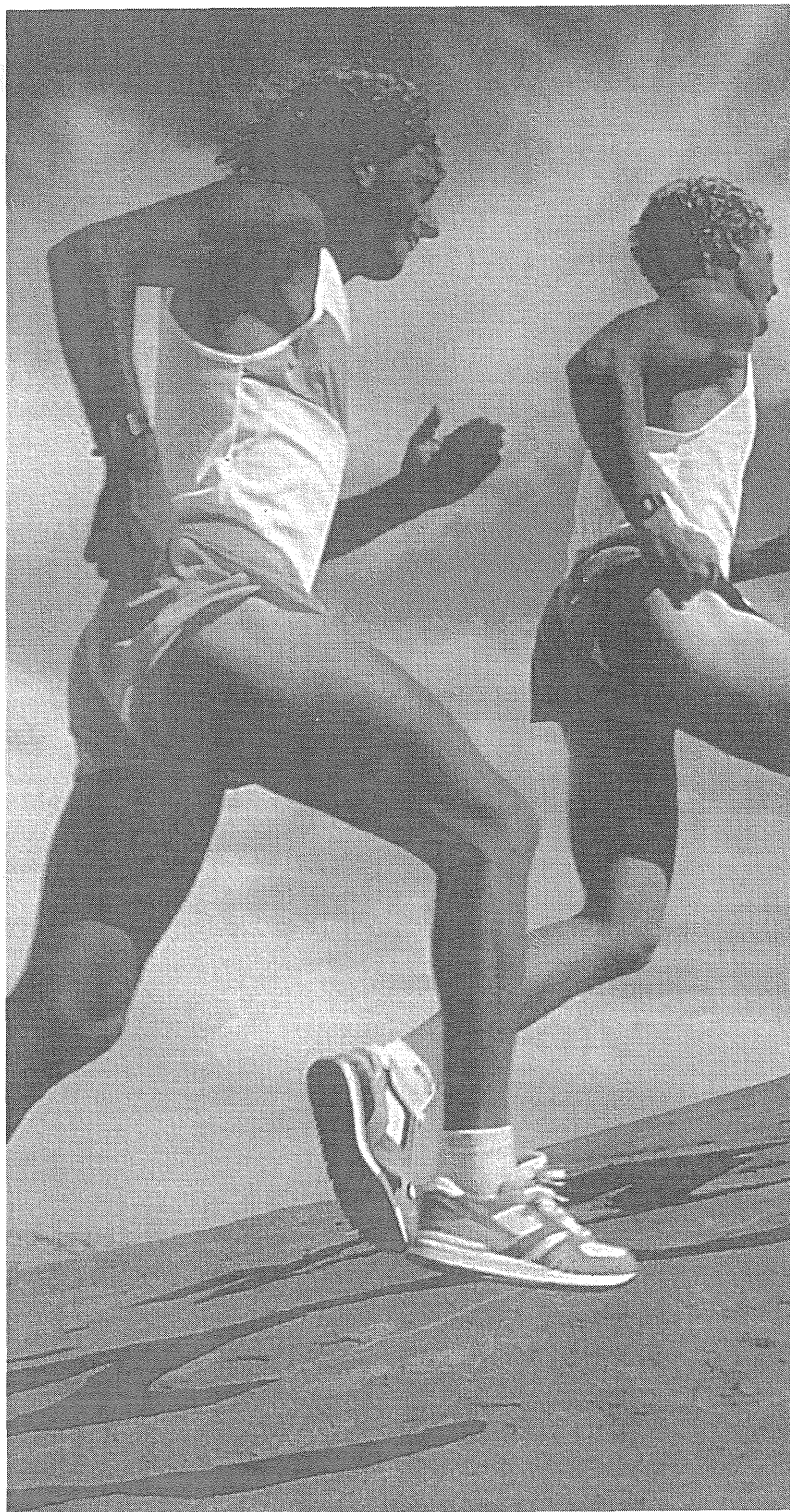
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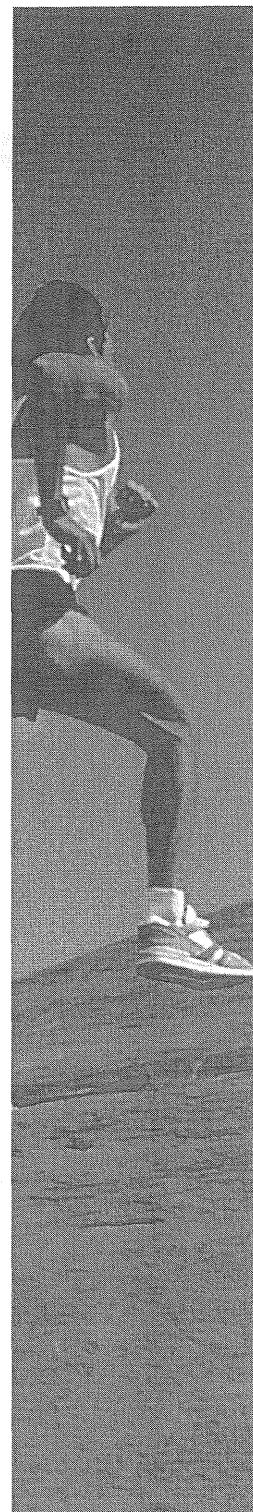
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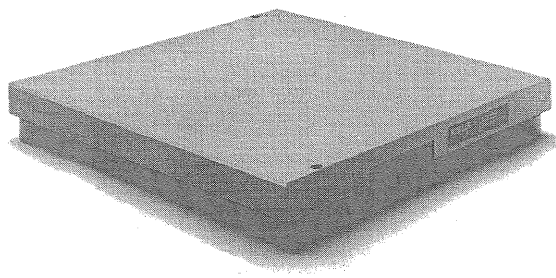
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