Editorial

Recently I was asked by a solicitor: Is an architect in fact qualified to assess ergonomic matters and discuss the applicability of occupational health and safety legislation? Many ergonomists would have observed situations that would justify reasonable doubt … but it would be unfair to dismiss the question lightly. My response was that architects should have some understanding of ergonomics but their level of competence would be dependent on personal interest and experience and the particular syllabus offered by any architectural faculty. Similarly, all professionals involved with workplace design, construction, maintenance and operation should have been exposed to information about occupational health and safety (OHS) legislation — but that does not necessarily generate a capacity for an expert opinion in such matters. Ergonomics is a topic for which many lay and professional people believe they have innate understanding … without formal qualifications. In Australia this has been exacerbated by the lack of discrete undergraduate courses in ergonomics. Most professional in this area have obtained post-graduate qualifications here or overseas following undergraduate degrees in a variety of related disciplines.

The diversity of academic disciplines involved in ergonomics provides both intellectual enrichment and an element of cultural uncertainty as to ultimate identity. In terms of community awareness, one’s primary discipline may be appreciated even more readily than an additive that is thought to represent basic commonsense rather than an art and a science of ergonomics. Part of the dilemma is illustrated by the current uncertainty about possible renaming of the ESA. Ergonomics and Human Factors really does smack of Water and H2O … but can we devise a better alternative? Thankfully there has been a response to the opening debate in the June edition of Ergonomics Australia. Please read "Forum" in this edition and give serious thought to the implications for the future of our profession … then hit your keyboards to participate!

Perhaps one of the best examples of the diversity of ergonomics talent in relation to the wider community will be found in the Report about work in East Timor by ESA members David Caple and Andrea Shaw.

The matter of art and science as intrinsic parts of ergonomics activity is illustrated in material submitted for the September edition of our Journal. The quantitative versus qualitative aspects of our discipline have been a continuing topic of concern in recent ErgoWeb discussions hosted by the USA. Both approaches are necessary: but there is danger in becoming obsessed with measurement as proof of ergonomics science at the expense of the art of human understanding. In many forensic cases the expert witnesses may offer a series of documents / guidelines / regulations that show erudition on the part of the witness (and certainly provide a report of sizeable dimensions) but demonstrate limited awareness of the human situation under investigation. The reality check comes not with books on shelves but in contents read, comprehended and inwardly digested!

The need to understand legislative intent — and an ability to create specific practical solutions — are the biggest issues emerging from the current trend to abandon prescriptive specifications in favour of the informed negotiation required to determine discrete performance outcomes. The problem is reflected in examples of insecurity demonstrated by numerous reactions to the new approach being adopted by OHS Regulations, the Building Code of Australia (BCA), the International Standards Organisation (ISO) and our own Standards Australia. The editor is currently engaged in preparing a Guidebook for use following this cultural shift as it affects cleanrooms and associated controlled environments … and when she recently chaired a formal Technical Function on the topic, the nervous concern among many attendees was palpable. The need for informed clients, consultants, contractors and suppliers is a cultural transition that is timely and should be self-evident; but it is proving very disturbing for many people who find their former comfort zone has been replaced by a need for personal accountability.

The move to a refereed status for articles has been well supported to date by both authors and reviewers. This is an invaluable resource for enhancing public awareness of our discipline and the editor plans to bundle the four 2002 editions for distribution in 2003 to key personnel in universities and commercial enterprises to highlight the diversity of our professional outreach. This is intended as both a professional promotion and a commercial opportunity to seek opportunities to subsidise the cost of an increasingly valuable and marketable commodity: Ergonomics Australia. This effort needs YOUR support in each state and territory … to nominate the contacts and to personally visit them with the four editions of the Journal. Personal outreach will achieve benefits for all participants that are simply not realised by an impersonal distribution. We must be proactive and not sit around waiting for the world to miraculously discover our hidden talents. All ESA members need to be agents for contributing or sourcing journal articles, serving as referees where appropriate, and marketing the product so that we attract a subscription base beyond our membership … in all states and territories.
As previously advised, the December issue is intended to feature articles on ergonomics in sport and leisure and contributions are eagerly awaited. One paper has been promised so far and is in the pipeline for review — but this is still a precarious situation in these early days of a refereed journal when there is no backlog of material awaiting publication.

The 2002 CybErg Conference will be underway by the time this Journal lands on your desk. To date there will be delegates attending from over 30 countries. Can you afford not to be part of this scene? The EA editor has been asked to chair the Symposium on Ethics and Ergonomics and dearly hopes that Australians will be represented in force at this event. There will just be time to then prepare for the combined ESA-CHISIG Conference in Melbourne in November. Good networking everyone!

Shann Gibbs PhD
Editor

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Some Notes on Human Computer Interaction

(Sent to Editor — in sympathy with her recent computer dramas! Original sources unknown.)

Dr. Seuss Explains Why Computers Sometimes Crash

(Read this aloud, if you can!)

If a packet hits a packet on a port, and the bus is interrupted at a very last resort, and the access of the memory makes your floppy disk abort, then the socket packet pocket has an error to report.

If your cursor finds a menu item followed by a dash, and the double-clicking icon puts your window in the trash, and your data is corrupted cause the index doesn’t hash, then your situation’s hopeless and your system’s gonna crash!!

If the label on the cable on the table at your house says the network is connected to the button on your mouse, but your packets want to tunnel to another protocol, that’s repeatedly rejected by the printer down the hall, and your screen is all distorted by the side effects of gauss, so your icons in the window are as wavy as a souse; then you may as well reboot and go out with a bang, ’cause sure as I’m a poet, the sucker’s gonna hang!

When the copy of your floppy’s getting sloppy in the disk, and the macro code instructions cause unnecessary risk, then you’ll have to flash the memory and you’ll want to RAM your ROM.

Quickly turn off the computer and be sure to tell your Mom!

Japanese Error Message

In Japan, the impersonal and unhelpful Microsoft error messages have been replaced with Haiku poetry messages. Haiku poetry has strict construction rules. Each poem has only 17 syllables; 5 syllables in the first, 7 in the second, 5 in the third. They are used to communicate a timeless message, often achieving a wistful, yearning and powerful insight through extreme brevity. Here are 16 actual error messages from Japan.

Below, the essence of Zen:

Your file was so big.
It might be very useful.
But now it is gone.

The Web site you seek
Cannot be located, but
Countless more exist.

Chaos reigns within.
Reflect, repent, and reboot.
Order shall return.
Letters to the Editor

1. Please find enclosed the Call for Papers for the Seventh International Symposium on Human Factors in Organizational Design and Management, which will take place in Aachen, October 1st - 3rd 2003. The conference will be organized by Prof. Holger Luczak and myself. We both would be very happy, if you could give this information to your members – may be within your regular newsletter or by any other way.

Thank you very much for your support!

Prof. Dr. Klaus J. Zink
University of Kaiserslautern
[Ed: see details in Conference Calendar]

2. I noticed in the June Edition of Ergonomics Australia that the Board is working towards accrediting ergonomics courses. I know that there seemed to be some difficulty in the IEA’s putting up the IEA guidelines on the web. The Standards for accreditation presented in 2000 have not been modified and so to assist you (if this is necessary), I am sending you the IEA Guidelines as they currently stand.

Margaret Bullock
[Ed: the document is available in this edition’s IEA Column]

3. The joint 7th Southeast Asian Ergonomics Society (SEAES) Conference and 4th Malaysian Ergonomics Conference (MEC) will be held in Kuching, Sarawak, Malaysia from 19 – 22 May 2003. The theme of the conference is ‘Ergonomics and Design Innovations for Regional Prosperity’. The SEAES conference is a triennial event in conjunction with its General Meeting, while the MEC is an annual activity supported by the newly formed Ergonomics Society of Malaysia.

I seek the cooperation of your societies – Ergonomics Society of Australia, Human Ergology Society, Ergonomics Society of Singapore, Perhimpunan Ergonomi Indonesia – in supporting the joint conference. The cooperation includes dissemination of information to society members and encouragement of participation at the conference.

The conference brochure which is due for print will be sent to you in September. We look forward to your favourable and early response.

Halimahtun Khalid & Aida Velasco
General Conference Chairs
SEAMEC 2003
Email: seamec@unimas.my
VALE - Additional Tributes to David Ferguson

David Ferguson was the founding father of the application of ergonomics to Occupational Health and Safety in Australia. He was the innovator of the University of Sydney education program. Many of the leading ergonomists in Australia today have been trained by David or his students. The name “Ferguson et al” will remain amongst the best ground breaking research in applying ergonomics to industry.

David was a very capable yet humble person. I recall 2 years ago when the ESA wanted to nominate him for the Clunies Ross Award for outstanding contribution to science in Australia. He was a reluctant applicant although his credentials were outstanding based on the selection criteria. The feedback from the selection was panel was extremely positive however they were actually wanting scientists who had not already retired. Otherwise I feel confident he would have received his due recognition as a leading scientist in Australia.

David was a wonderful mentor to all. His encouragement during ESA conferences to his students and others provided the motivation to pursue research even if the opportunities in Australia were limited.

It was a delight as Chair of the ESA Honours and Awards Committee for the ESA Board to agree to an award for post graduate research to be named as the “David Ferguson Award” to be developed in his honour.

We will all miss David but his positive legacy will live on.

David C Caple

One of David Ferguson’s most notable achievements was to develop a strong professional and scientific image for ergonomics during its early years in Australia. His academic position, his clearly expressed thoughts and sound scientific approach gave ergonomics much needed credibility. A one-week course on Ergonomics for Industry which he organised in Sydney in 1967 was inspirational to many including myself. Lectures were given by a range of experts in their fields, but the lectures by David Ferguson were the most appreciated and his lecture notes proved to be a useful reference for many years. David later edited and contributed to the widely distributed booklet “Introduction to Ergonomics”, published by the Productivity Promotion Council in 1971 and revised in 1979 as “Ergonomics in the Australian Workplace”, and this further helped to disseminate the value of ergonomics to industry.

David did pioneering research on repetition injuries in factory workers and telegraphists, and published papers on this work in the early 1970’s. When the rather sensationalised RSI “epidemic” was taking place in the 1980’s, David’s comments were among the few which provided authority and balance. David was not only responsible for the introduction of lectures in ergonomics at the University of Sydney, but also participated in and encouraged us in the development of ergonomics courses at the University of NSW and WorkSafe Australia. My contacts with him were invariably friendly, helpful and much appreciated.

Mike Stevenson

You will be aware that Prof David Ferguson died in March this year at the age of (nearly) 82 years. He was the first Prof of Occ Health in Australia and the first person to promote ergonomics in OH in Australia. He was a Founder of the ESA (at that time the ESANZ) in the mid 1960s.

A Memorial ‘Service’ is being held for him on Wednesday 23 October in the late afternoon (4:00 to 4:30pm) in the MacLaurin Hall at the University of Sydney.

If you would like to attend please let me (Barbara McPhee) know asap. Catering needs to be arranged.

This is an opportunity for a get together of all those people who know each other because of David, or because they work in ergonomics — or any other reason.

It’s lovely time of year in Sydney – and especially at the University and we want to give David the send off he would have enjoyed. His maxim for his students, colleagues and friends when going to ESA conferences was ‘Attend all parties’. I think the ESA has done very well from that advice!

If you can spread the word and let as many people know who may interested that would be great. Many may be retired or living outside Australia. We would love to see them all.

Look forward to hearing from you.

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IEA Column

Standards for Accreditation of Ergonomics Education Programs at Tertiary (University) Level

Preamble

Standards of professional practice may be assured by a number of means. These may include a high standard of education and a process of accreditation of educational programs and of relevant aspects of the Institutions which offer them.

A national accreditation process serves to indicate whether a particular program meets the criteria for preparing graduates appropriately and for attaining a standard specified by the professional Society. That is, it provides an assurance to the profession that professional standards have been met.

As part of its concern for quality performance in practising ergonomists and in an attempt to assist Federated Societies to develop their own accreditati on processes, the IEA has developed a set of guidelines for the accreditation of ergonomics educational programs.

The IEA committee formed to carry out this task identified those features relevant to quality and maintenance of high standards which should be addressed in an accreditation review and then specified the expectation and standards relevant to each of those features. The committee also attempted to indicate the need to consider accreditation according to level of award, cultural differences and to professional expectations and approaches in any particular country.

These Guidelines are offered to Federated Societies for their application as they see fit.

January, 2000

Introduction

The role of an accrediting authority is to evaluate the ergonomics educational program and the capacity of the Institution offering an award in ergonomics to do so according to specified standards. Accordingly, the Accreditation committee should consider not only the curriculum and the process of education, but also the mechanism employed to ensure quality outcomes, the resources and facilities available, (including laboratories, libraries and computer access), and the performance of graduates. Issues relating to student selection and progression, faculty expertise and development, and arrangements for supervised work experience need to be addressed.

A process of accreditation requires the formulation of relevant committees, the establishment of levels of accreditation both for existing programs and for new proposed programs and the outlining of procedures to be followed by each relevant party in moving through the accreditation process.

Principles Applied

In the process of reviewing educational programs for accreditation purposes, it is important that in the application of these standards, the following principles be applied:

- criteria used in evaluating programs do not intrude upon the diverse and unique character of individual programs/institutions
- there is recognition that excellent education programs may differ in many respects and that educational objectives may be achieved in a variety of ways
- innovation in achieving educational objectives should be encouraged
- while an accreditation process may review details of a number of input elements, it will not be prescriptive in terms of precise curriculum details (such as hours in any one subject), but will seek to be convinced that competencies can be developed adequately.
- an educational program should address professional issues relevant to the time and needs of the marketplace.
- the process of accreditation should be based on the principles of equity and justice in that the profession should be assured that the standards will be interpreted fairly and without bias.

Note:

The criteria which could be applied to an accreditation process are outlined in some detail below. In keeping with the principles espoused above, flexibility in application of these criteria needs to be shown as appropriate to the country, its needs and objectives, the level of the program and the facilities available.

Institution

The College/University providing the education should be accredited by an appropriate governmental agency in the geographic area, if such a process exists in that country. Where such arrangements do not exist, the Institution should be accredited by an appropriate professional body.
Faculty

Characteristics
Each academic faculty member has documented expertise in their area of teaching, demonstrated effectiveness in teaching and evaluation of students, and a record of involvement in scholarly research and/or professional activities consistent with the philosophy of the program and the needs of the ergonomic community.

Qualifications
The academic faculty have a sufficient mix of qualifications to conduct the program successfully, including a diversity of areas of expertise, a diversity of academic qualifications relevant to ergonomics and experience in curriculum design and development. Faculty normally possess a Ph.D. in an appropriate cognate field. A Masters degree may be acceptable when combined with a record of quality work in an applied domain.

Publications
Each faculty member’s publication list reveals productivity in research and demonstrates active contribution to refereed journals or presentation of technical or other such reports, in the fields of ergonomics, human factors or cognate sciences.

Relevant experience
Faculty as a whole have ergonomics/human factors experience in:
- publishing outcomes of research
- systems development or applications
- supervising doctoral dissertations (or Masters theses where appropriate), where the program is at postgraduate level

Degree of accountability
The person with explicit responsibility for the program and faculty evaluation, and to whom faculty report their activities is clearly identified.

Professional standing
Faculty are members of appropriate professional societies and abide by their professional standards and codes of ethics.

Participation in professional issues
Faculty demonstrate their commitment to the advancement of the profession and to discussion of professional issues relevant to the time by participating in leadership positions and on professional committees.

Professional development activities
Faculty demonstrate an interest in remaining up-to-date by participating in continuing education programs, where relevant.

Availability of support staff
The program has adequate support staff and services to meet the needs of the students and academic staff.

Faculty-student consultative process
There is adequate time available and access to academic faculty for students to consult on progress and course content.

Students

Pre-requisites for entry
Entry into the program is offered on an assurance of equal opportunity with respect to race, creed, colour, national origin, gender, age, handicap, socio-economic and marital status.

The academic pre-requisites and any other specific criteria for entry to the program are clearly stated and are compatible with the requirements of the program.

Where an Institution chooses to admit students without all pre-requisite sciences, arrangements are made for students to rectify these deficiencies.

Student/faculty ratio
Viability of the program in terms of faculty and student numbers can be demonstrated.

Faculty/student ratios for class work are appropriate for the subject and ensure quality of supervision.

Policies on progression and graduation
Policies and procedures relevant to repeat enrolments after failure, competence required for progress, maximum time allowable for course completion and final graduation are clearly stated and made available to students at the commencement of the program.

Student workload
The program clearly outlines the expectation of study (work load) in relation to each component of the program, including course work and research projects and theses.

Ergonomics Program and Approaches to Teaching/Learning and Problem Solving
The program is of sufficient duration to prepare the student in a comprehensive and defined set of ergonomics competencies and for the level of qualification awarded.
The philosophy and objectives of the program are clearly stated and are consistent with the professional practice of ergonomics.

The program reflects the current needs for ergonomics in industry, government, and academia.

The program identifies the scope and level of ergonomics practice for which it prepares the students by reference to the comprehensive set of competencies to be introduced and the sub-set of competencies to be addressed in depth.

The program facilitates the student’s potential for gaining certification as an ergonomist.

Policies, procedures and program information is current and readily available to the students, particularly those related to the aims and objectives, assessment, progression and requirements for graduation, appeals processes, costs and academic review processes.

The program utilises a range of teaching and learning methods appropriate to the achievement of the objectives and the learning styles of the students.

An interdisciplinary learning environment is provided to offer opportunities to learn from and be influenced by knowledge from outside as well as from within ergonomics. Students are made aware of multiple styles of thinking, diverse social concepts, values, and ethical behaviours that will prepare them for identifying, redefining and fulfilling their responsibility to society and the profession.

The program includes opportunities for students, supervised or mentored by ergonomics academic faculty, workplace supervisors or certified ergonomists, to participate in such activities as field trips, internship/practica at industrial, institutional or governmental work sites. Where the program structure precludes field trips, where-ever possible, opportunities should be provided in laboratories where ergonomics programs are planned and implemented and/or where ergonomics research is performed.

The program provides opportunities for both independent and group/co-operative learning experiences.

**Ergonomics Curriculum**

The list of criteria provided below addresses the range of competencies included within the IEA Competency Standards. In some instances, full coverage of this list would be more than could be expected for the particular qualification offered. It is understood that each program will focus on certain aspects of content and may choose to leave a number of areas for additional detailed study at an appropriate level of education.
It is anticipated that for each Institution and level of qualification, the curriculum will be designed in sufficient depth and breadth to ensure that the desired objectives and outcomes of the program can be achieved; that is, the preparation of graduates as competent ergonomists who have been introduced to the broad spectrum of ergonomics competencies (as expressed in the IEA Core Competency Standards) and have a depth of understanding in a defined subset of competencies.

In some instances, specific features of content might be covered in pre-requisite study.

Content
The content of the curriculum addresses ergonomics practice and professional issues relevant to the time.

The program curriculum (or accepted credit for prior learning) includes:

- theoretical concepts and principles of those aspects of physical, biological sciences, social and behavioural sciences relevant to ergonomics.
- theoretical concepts and practical experience to provide a breadth of knowledge across core areas, and a depth of knowledge in a specialised application of ergonomics consistent with the focus of the Institution, where applicable, and as achieved by a thesis or project.

provides:

- a working knowledge of physics, mathematics, functional anatomy, patho-physiology, exercise physiology, environmental science, and sensory, cognitive and behavioural psychology, organisational psychology, and sociology, relevant to the practice of ergonomics.
- an understanding of the concepts and principles of:
  - human-system interface technology
  - organisational management
  - participatory ergonomics
  - the perceptual and cognitive aspects of information intake, information handling and decision making
  - the psycho-physiological bases of perception and cognition
  - human characteristics, human variability, human error and human reliability
  - human development and motivation
  - group functioning and socio-technical systems
  - risk, risk assessment and risk management
  - the environment (acoustic, thermal, visual, vibration) and its effects on human senses, human health and performance
  - occupational hygiene
  - industrial safety
  - systems theory and systems design
  - survey methodology, including observational and surveillance techniques, epidemiological approaches
  - analysis of feedback
  - instrumentation relevant to evaluation or design of workplaces, work procedures or work equipment
  - methods of measurement and investigation of work and interpretation of results
  - technology
  - ergonomic analysis and planning in a variety of contexts
  - work analysis
  - instrumentation and design methodology
  - workplace design
  - product design
  - information design
  - work organisation design
  - safety management
  - user trials
  - computer modelling and simulation
  - experimental design and statistics
  - marketing ergonomics

ensures ability:

- to apply knowledge in relation to human characteristics, human variability, recognition of psychological characteristics and responses and how these affect health, human performance and attitudes, and in relation to biomechanics, anthropometry, motor control, forces applied, and stresses and strains produced in the human body
- to appreciate the effect and interaction of factors influencing health and human performance and which have the potential for generating injury, disease or disorder
- to apply a systems approach to analysis
- to undertake observational analysis of human performance or product use
- to undertake surveys of various types, including operator considerations
- to carry out workplace surveillance
- to determine demands placed on people by tools, machines, jobs and environments
• to evaluate products or work situations in relation to expectations for safe and effective performance.
• to apply and validate quantitative and qualitative measurement methods appropriate to ergonomic appraisal and design
• to apply knowledge of human – system integration technology
• to use computer and other technology for technical calculations, data acquisition and processing, process control, design and other ergonomics-related functions and applications
• to match measurements against identified Standards and legislative requirements
• to determine the compatibility of human physical and psychological capacities and planned or existing work demands
• to identify high risk areas and high risk tasks
• to develop a holistic, integrated, balanced and prioritised plan for ergonomic design
• to apply ergonomic principles in the control of organisational, physical, psychological, social and environmental factors which could influence human performance, an activity, a task, or use of a product
• to identify and quantify the potential benefits and costs of possible ergonomic solutions
• to apply the process of experimental design and statistics to ensure appropriate and thorough data analysis and interpretation
• to consider participation, role analysis, career development, autonomy, feedback and task redesign, as appropriate to the client and the defined problem
• to apply individual and organisational change techniques, including education and training, work structuring and motivational strategies
• to communicate effectively with all relevant personnel and to prepare succinct reports
• to test proposed solutions under realistic conditions
• to evaluate the outcome of implementing ergonomic recommendations

Objectives

The specific learning objectives and teaching plan are available for each unit of instruction.

Experiences

Learning experiences include, at least, the integration of

a. problem definition - through task analysis, error analysis, operational analysis, etc.
b. the design of experiments and/or equipment
c. collection of data on operational users
d. statistical analysis and interpretation of data
e) the presentation of findings to operational personnel
Integration
The curriculum is organised in a sequential and integrated manner to ensure effective learning and is designed to ensure the progressive development of skills of independent thinking, ethical and value analysis, communication, reasoning, problem solving skills and decision making.

Through interdisciplinary instruction and assigned projects, students are exposed to research and practice issues which provide a holistic appreciation of the scope of the field of ergonomics.

Through involvement in a structured and concrete research or design project, students are introduced to the integrative, interactive, social and iterative nature of applying ergonomics.

The program is structured to include classroom, laboratory, field and research experiences and the timely and progressive exposure of students to a variety of work place problems of increasing complexity.

Professional, legal and ethical issues
Students are made aware of current professional, organisational, legal and ethical issues pertinent to ergonomics practice.

The regional Ergonomics Society is consulted to ensure that all relevant issues are fully addressed.

Practical experience
The practical experience has sufficient breadth, depth and coverage to ensure that
- the objectives of the program are met
- the students have the opportunity
  - to integrate theoretical concepts into ergonomics practice;
  - to perform professional responsibilities for ergonomics application under appropriate levels of supervision or mentoring,
  - to observe professional role modeling, and
  - to practise with timely and constructive feedback their skills and reasoning.

In the workplace environment, specific procedures are established for communication between the mentors and students so that issues of ergonomics design may be fully addressed.

Specific procedures are established for communication between work place mentors and the faculty on professional, curriculum and administrative matters.

The program encourages the development of student portfolios which contain quality work products.

Life long learning
The content of the curriculum and the organisation of the learning experiences foster a commitment to continuing professional growth including learning through self-directed, independent study.

Evaluations and Assessments
Standards expected
The standards of achievement expected are clearly stated to students and are related to their professional practice and the IEA Competency Standards.

Nature of progressive and final evaluation
The program utilises a range of assessment methods appropriate to the objectives for both formative and summative purposes.

Evaluations match the competency being assessed, and include written, oral and practice formats.

Students receive regular feedback on performance.

Final evaluations provide an opportunity to assess overall and comprehensive knowledge, attributes and skills relevant to ergonomics practice and professional behaviour.

Reviews of assessment methods
Assessment methods are reviewed and evaluated regularly in terms of student load and their validity, reliability, emphasis, balance, appropriateness and relevance to the IEA Competency Standards.

Research and Scholarship
Philosophies towards research
The relationship between research activities and the content and delivery of the program is well recognised and is demonstrated by faculty and student involvement in research and scholarship related to the ergonomics profession.

The nature of research reflects the principal objectives of the program.

Faculty and student involvement in research
The approach taken to encouraging research ensures that students gain an adequate understanding of research methodology so that they may accomplish applied studies in relevant professional positions.

Faculty and students are actively involved in research activities integral to the program objectives.

Faculty act as effective mentors for students.
Quality Management

Mechanisms for quality management and maintenance of standards
The program is offered in a recognised accredited tertiary education institution, preferably a University, which is supportive of ergonomics both as an academic and professional discipline.

Programs are approved by an accredited University and are in compliance with regional academic regulations.

There is an ongoing program of evaluation of the performance of the faculty which includes the assessment of teaching ability, scholarly activity and administrative competence.

The organisational structure provides a career path for faculty and an ongoing program of professional development for all faculty which is linked to evaluation of performance.

Accountability to University and to the ergonomics profession
The program has established mechanisms of accountability to the University and to the ergonomics profession.

There is a clear and accessible description of the academic governance of the program with demonstrated lines of accountability and responsibility.

Programs maintain records of attrition, pass rates, failure rates, graduations, honours received and professional recognitions.

Policies on course development
There are clear and comprehensive policies on course development.

Policies on review of course content, relevance and quality
There are clear and comprehensive policies for periodic review of course goals, content, relevance and quality.

The curriculum is developed and regularly reviewed at an institutional level by the faculty of the program with input from representatives of the profession, the student body and other interested groups.

Organisational structure for program overview
There is a clearly defined organisational structure for the overview of the program.

The faculty regularly review the admissions criteria, including pre-requisite subjects as part of the evaluation of the effectiveness of the program in preparing graduates to be competent ergonomists.

Facilities and Resources

Funding available per student unit
The program has adequate funding available per student to provide sufficient numbers of staff and resources to achieve the program goals.

Equipment
The students and faculty have access to sufficient equipment (particularly design and electronic equipment) relevant to ergonomics and human-system interface technology, and consumables to provide the means for effective learning and research.

Computing
Sufficient space and computing facilities are available for students to have appropriate access over a prolonged period of the day. Appropriate and up to date computing packages relevant to ergonomic applications and to data analysis are available for student use.

The students have ready access to informational resources including the World Wide Web and E-mail.

Laboratories available
There are sufficient classrooms, laboratories, work place facilities, offices and space for students, faculty and support staff to provide an environment conducive to learning and research.

Library facilities (accommodation, hours of opening, search facilities, inter-library loan, specialist support)
The students have ready access to a well maintained and catalogued library of appropriate media and holdings that are current and sufficient in number and breadth to support the content of the curriculum and to meet the needs of the program.

Other services
The students have ready access to those services which will facilitate their successful completion of the program including student counselling, educational support including language instruction, health and residential facilities, and financial aid.

There are occupational health and safety policies relating to a safe working environment, sexual harassment and disability
Ergonomists in East Timor

Two members of ESA, Andrea Shaw and David Caple, are among the volunteers from Australia who have been visiting East Timor to assist in their reconstruction since independence.

Andrea conducted her first visit soon after Independence as part of an assistance program co-ordinated through the local labour movement. She prepared a comprehensive report specifically relating to the health consequences of handling asbestos materials during the clean up after the destruction left so many buildings destroyed.

Andrea has also been volunteering her expertise through the Sister relationship between the city of Ballarat and a province in East Timor. She is planning a further visit in the new future.

David Caple will be visiting East Timor in September 2002, to volunteer services in reviewing the potential introduction of OH & S Legislation frameworks suited to the fledgling government. An initial workshop was conducted in Melbourne during July with East Timorese government representatives who were visiting Australia as part of an information collecting program.

The invitation to visit East Timor to conduct a series of workshops and discussions has been strongly supported by the Minister in Dili who has a wide range of responsibilities including agriculture, fisheries and water supply.

WorkSafe Victoria is supporting this initiative by donating a large collection of OH & S publications for the East Timor government to utilise as part of their evaluation and development of a strategic approach to managing OH & S.

The initiative in East Timor is consistent with the IEA approach towards industrially developing countries. This program is supported by the ESA as part of its contribution to international initiatives.

Such participation is inevitably rewarding to all parties. Other ESA members interested in visiting or supporting industrially developing countries — particularly in the Pacific Rim area — are encouraged to contact David Caple. David, together with Margaret Bullock, is the ESA delegate to the IEA.

David Caple
E: dcaple@mira.net

Honours and Awards Committee

On behalf of the Honours and Awards Committee and the ESA Board, I would invite all members of the ESA to consider nominating for any of the following awards.

As part of your membership of ESA, it is important to recognise the role of peer recognition in maintaining the standards of research and application of ergonomics in Australia.

Please read the criteria for each of the awards listed below. If you feel that you, or one of your colleagues, would qualify for consideration for these awards, I welcome the nomination.

Could you please make contact with the Honours and Awards Committee via the ESA office in Canberra?

The presentation of the 2002 Awards will occur during the annual conference to be held in Melbourne during November.

Please feel free to make contact directly with me (Chairperson of H & A Committee) or other committee members whose contact details are printed in your ESA Members’ Directory:

Professor Tom Triggs
Mr Roger Hall
Ms Barbara McPhee

I look forward to receiving the nominations prior to the end of September 2002.

David C Caple
Chairperson
Honours & Awards Committee

Society Awards

The Ergonomics Society of Australia presents seven national awards that reflect outstanding achievement by individuals or groups for service to the Society and the ergonomics profession as well as to the research and application of ergonomics in Australia. Five of the awards are named after the founders of the Society in 1964. They all have been President and are Fellows of the Society. State Branches and national Special Interest Groups of the Society also present several awards.

Fellowship

• “For outstanding contribution to the Society and the ergonomics profession over a period of at least ten years”.

• Awarded to a member of the Society in good standing.

• The Award is based on the assessment of the Honours & Awards Committee and ratified by the Society Board.

• The Award is in the form of a membership certificate showing Fellow and confers honorary status.
The Society Medal

• “For outstanding service to and promotion of the Society over at least seven years”.
• Awarded to a member of the Society in good standing.
• The Award is based on the collaborative assessment of the Society President and the Honours & Awards Committee.
• The Award is in the form of a medal suitably inscribed with the recipient’s name.

Cumming Memorial Medal & Lecture

• “For highly esteemed ergonomics research or application in a relevant area of ergonomics”.
• Awarded to an Australian resident, preferably a member of the Society.
• The Award is based on the assessment of the Honours & Awards Committee.
• The Award is in the form of a Medal suitably inscribed with the recipient’s name together with the presentation of the Cumming Memorial lecture at the Society’s Annual Conference.

Ken Provins Award

• “For the best paper presented during the Society’s Annual Conference”.
• Awarded to individual or joint authorship but not for a keynote speaker.
• The Award is based on both the written paper and the oral presentation at the conference.
• The Award is in the form of a Certificate for each author.

Alan Welford Award

• “For the best paper on an ergonomics topic published in a peer reviewed journal”.
• Awarded to individual or joint authorship, one of whom is a member of the Society.
• The Award is based on the intrinsic merit of the paper itself and its readability for the target audience.
• The Award is in the form of a Certificate for each author.

John Lane Award

• “For a major systematic contribution to advancing the science of ergonomics and its application in Australia”.
• Awarded to an individual, group or organisation having a relevant ergonomics connection with Australia.
• The Award is based on merit and may not be awarded every year. It includes work carried out over several years, during the last five-ten years.
• The Award is in the form of a Certificate.

David Ferguson Award

• “For the best postgraduate project report or undergraduate honours thesis”.
• Awarded to an individual student enrolled in a relevant Australian University program of study.
• The Award is based on a paper summarising the report or thesis together with a supporting statement from the student’s supervisor.
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WORLD CLASS: BE PART OF IT
RESEARCH

A comparison of musculoskeletal disorders among female nursing-home nurses in Japan and Korea

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Ron ATKINSON (BSc [Hons], PhD) 1
Hiroyoshi KUBO (MD) 2
Zentaro YAMAGATA (MD, PhD) 2

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Abstract

We conducted a questionnaire-based study of musculoskeletal disorders (MSD) among 113 female, nursing-home nurses from matched facilities in Japan (61) and Korea (52). Most physical and demographic characteristics were similar between the two, although the average age of the latter group was higher. MSD at any site was reported by 77.0% of the Japanese and 65.4% of the Korean nursing-home nurses within this investigation. Low back pain (LBP) was the most frequently reported MSD among the Japanese, affecting 68.9% of them. This result was significantly higher than LBP within the Korean group (p<0.0001), where it was reported by 25.0% of those surveyed. Shoulder pain was the most common MSD among the Korean nurses (44.2%), followed by pain in the upper arm (28.8%), knee (28.8%) and wrist (26.9%). Shoulder pain was also common amongst the Japanese participants (affecting 41.0%), as was neck (37.7%), knee (23.0%) and upper arm (19.7%) MSD. The risk of developing any condition was 8.3 times greater (95%CI 2.0-43.7, p<0.01) among Korean nurse aides when compared to registered nurses of the same country. We therefore suggest that future ergonomic interventions for nursing home staff should target this high risk group.

Keywords
Musculoskeletal disorders, nursing-home nurses, Japan, Korea

Introduction

Musculoskeletal disorders (MSD) are an important source of morbidity among nursing-home nurses the world over. As most palliative patients require constant assistance for their activities of daily living, staff that provide this care are at high risk of developing MSD at some stage in their career. Previous studies have shown predictive factors to include not only social and workplace factors,1 but also the dependency levels of patients within their care.2 Japanese research has further demonstrated a possible link between aging, sporting activity and exercise and the development of various MSD among Asian nursing home staff.3 Prevalence studies of equivalent Korean workers however, appear to be rare. Although Japanese and Korean palliative care staff share many similar physical and employment-related characteristics, to our knowledge there have been no comparative studies of MSD prevalence within these adjacent Asian nations. Thus, it was considered appropriate to conduct some of the first research of this nature.

Materials and methods

We initially selected 2 Japanese nursing homes in Yamanashi Prefecture, Japan and 1 equivalent facility in Seoul, Korea and approached them to join the study. To avoid gender bias and occupation-specific differences, only female nurses were included. All subjects completed a simple, anonymous survey with questions regarding age, height, weight, job description, presence of MSD within the past 12 months, duration of current employment and the number of patient-handling tasks undertaken per day. Where MSD was reported, nurses were also asked if they had taken sick leave for their condition. Data from the 2 groups were analysed separately and then compared using Pearson’s chi square test for statistical significance. Potential risk factors were also investigated using logistic regression, with p values above 0.05 considered statistically insignificant throughout.

Results and discussion

For this study a total of 113 nursing staff were recruited, among whom 61 (53.9%) were Japanese and 52 (46.1%) Korean. Although the Japanese nurses were significantly younger than the Koreans (33.7 yrs vs. 47.4 yrs, p<0.0001), their physical characteristics such as height, weight and body mass index (BMI) were very similar (Table 1). This reflects a previous study conducted by Fujimura et al2 where the mean height and weight of Japanese nursing-home nurses was reported at 153.8 cm and 53.1 kg respectively. The Korean nurses’ body mass was also similar to previous Korean research conducted among female computer terminal operators (55.2 kg).4
However, it appears that nursing-home nurses may be older than hospital nurses at least in Korea; with a previous investigation revealing 85% of the latter group to be under 30 years of age.5 Weekly working hours and total years of employment were similar between the two groups, but different from that of Dutch nursing-home nurses (33 hrs per wk and 9.5 yrs).6 There were statistically significant differences (p<0.05) in the average number of bedside hours worked daily between the Japanese (7.5 hrs) and Korean staff (6.4 hrs). On the other hand, there was a higher proportion of nursing aides in the Korean group than among the Japanese participants (78.8% vs. 57.4% of all staff, p<0.01).

Table 1. Staff demographic and workplace items

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Japan</th>
<th>Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs) ***</td>
<td>33.7 ± 12.2</td>
<td>47.4 ± 6.7</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>157.0 ± 4.7</td>
<td>157.5 ± 5.4</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>52.0 ± 13.2</td>
<td>56.5 ± 6.6</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>21.6 ± 4.2</td>
<td>22.7 ± 2.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workplace items</th>
<th>Japan</th>
<th>Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly hours</td>
<td>41.6 ± 4.2</td>
<td>36.8 ± 15.4</td>
</tr>
<tr>
<td>Total years</td>
<td>5.2 ± 8.0</td>
<td>4.6 ± 3.7</td>
</tr>
<tr>
<td>Bedside hours *</td>
<td>7.5 ± 2.0</td>
<td>6.4 ± 3.2</td>
</tr>
<tr>
<td>Nurse aide **</td>
<td>35 (57.4) a</td>
<td>41 (78.8) a</td>
</tr>
<tr>
<td>Sample size</td>
<td>N = 61</td>
<td>N = 52</td>
</tr>
</tbody>
</table>

* p<0.05, **p<0.01, ***p<0.0001

MSD at any site was reported by 77.0% of the Japanese and 65.4% of the Korean nursing-home nurses within this study (Table 2). Low back pain (LBP) was the most frequent MSD among the Japanese nurses, affecting 68.9% of them. This result was significantly higher than for the Korean group (p<0.0001), where LBP was reported by 25.0%. Previous studies have revealed LBP among Dutch and Japanese nursing-home nurses at 38% and 77% respectively.6,2 Another Japanese study conducted by Kinugasa et al3 demonstrated that nursing home LBP prevalence varied between 64.9% and 75.9% depending on the age of staff. The prevalence among Korean nurses (25.0%) was lower than among computer terminal operators in the same country (39.8%).4 Shoulder pain was the most common MSD among the Korean group (44.2%), followed by pain in the upper arm (28.8%), knee (28.8%) and wrist (26.9%). Shoulder pain was also common within the Japanese group, affecting 41.0% of them. This result is much higher than stated in a previous report of Dutch nursing-home nurses (22%).6 MSD of the neck was statistically more common (p<0.01) amongst the Japanese (37.7%) when compared to the Korean nurses (13.5%). Interestingly, Engels et al has documented a neck MSD prevalence of 27% in Holland, which appears to be somewhere between these two figures.

Table 2. Prevalence of MSD by body site

<table>
<thead>
<tr>
<th>MSD location</th>
<th>Japan</th>
<th>Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%) a</td>
<td>n (%) a</td>
</tr>
<tr>
<td>Trunk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck *</td>
<td>23 (37.7)</td>
<td>7 (13.5)</td>
</tr>
<tr>
<td>Shoulder ***</td>
<td>25 (41.0)</td>
<td>23 (44.2)</td>
</tr>
<tr>
<td>Lower back **</td>
<td>42 (68.9)</td>
<td>13 (25.0)</td>
</tr>
<tr>
<td>Arms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper arm</td>
<td>12 (19.7)</td>
<td>15 (28.8)</td>
</tr>
<tr>
<td>Lower arm</td>
<td>9 (14.8)</td>
<td>9 (17.3)</td>
</tr>
<tr>
<td>Wrist</td>
<td>12 (19.7)</td>
<td>14 (26.9)</td>
</tr>
<tr>
<td>Legs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legs</td>
<td>9 (14.8)</td>
<td>10 (19.2)</td>
</tr>
<tr>
<td>Knee</td>
<td>14 (23.0)</td>
<td>15 (28.8)</td>
</tr>
<tr>
<td>Feet</td>
<td>5 (8.2)</td>
<td>8 (15.4)</td>
</tr>
<tr>
<td>MSD at any site</td>
<td>47 (77.0)</td>
<td>34 (65.4)</td>
</tr>
</tbody>
</table>

* p<0.01, **p<0.0001

a number of cases and percentage of cases per group
Only one statistically significant risk factor was identified through logistic regression during our investigation. The risk of developing MSD was 8.3 times greater (95% CI 2.0-43.7, p<0.01) among Korean nurse aides or assistant nurses when compared to registered nurses of the same country. A previous study of operating room nurses in Korea suggested that working posture, working environment, stress and job satisfaction were important risk factors for MSD.5 On the other hand, a Japanese investigation found that the patients’ dependency level was an important indicator of MSD among staff.2 We therefore suspect that working as a nursing-home nursing aide in Korea may involve many high-risk manual activities that predispose an individual to MSD. These tasks most likely include suboptimal working postures that vary according to the degree of care required by each patient. More dependent nursing home patients require extended physical assistance for almost all their activities of daily living; tasks that would presumably be delegated to the assistant nurse or nursing aide. By this mechanism, high-risk workplace activities eventually become concentrated among the latter group.

Table 3. Risk factors for self-reported MSD and comparative MSD analysis

<table>
<thead>
<tr>
<th>Demographics a</th>
<th>Japan</th>
<th>Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>OR b</td>
<td>(95%CI)</td>
</tr>
<tr>
<td>Age</td>
<td>1.4</td>
<td>(0.0-20.3)</td>
</tr>
<tr>
<td>Height</td>
<td>0.7</td>
<td>(0.0-15.8)</td>
</tr>
<tr>
<td>Weight</td>
<td>6.7</td>
<td>(4.2-2.3)</td>
</tr>
<tr>
<td>BMI</td>
<td>2.1</td>
<td>(2.2-2.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workplace items a</th>
<th>Japan</th>
<th>Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly hours</td>
<td>1.3</td>
<td>(0.0-40.4)</td>
</tr>
<tr>
<td>Total years</td>
<td>0.0</td>
<td>(0.0-1.3)</td>
</tr>
<tr>
<td>Bedside work c</td>
<td>0.3</td>
<td>(0.0-5.7)</td>
</tr>
<tr>
<td>Nurse aide c</td>
<td>1.1</td>
<td>(0.3-4.9)</td>
</tr>
<tr>
<td>Japan / Korea d</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* p<0.01, **p<0.0001
a odds ratios calculated for increasing increments of 1 yr, 1 cm, 1 kg, 1 kg/m^2, 1 hr and 1 yr respectively, b risk factors derived from logistic regression using MSD as the dependent variable and demographic and workplace items as the independent variables, c odds ratios (OR) calculated using the following reference categories (any bedside work / no bedside work, nurse aide / not nurse aide), d OR calculated from pooled data (Japan and Korea) using Korea as the independent variable, n/s (not significant), * p<0.01

Conclusion

Overall, our study has shown that MSD appears to be reasonably common among nursing-home nurses in Japan and a little less so among their Korean counterparts. LBP was the most important MSD within the Japanese group, while for the Koreans shoulder MSD appeared to be a more important issue. Working as a nursing aide was identified as a statistically significant MSD risk factor, which suggests that future ergonomic interventions for nursing home staff should target this high risk group.

Acknowledgements

We would like to thank Jae-wook Choi, Chun-hwa Oh and Jeong-ah Kim for their assistance in arranging the Korean research component.

References


Ergonomics in a subjective world.

David Brown, B.Sc. M.A.

INTRODUCTION

During the Somali-Ethiopian war in 1982, refugee children in Somali camps were dying after drinking contaminated water. An Australian nurse told me of her efforts to explain to their mothers that invisible malicious beings called “germs” lived in the water. Her audience rolled in laughter on the ground in disbelief at her naivety and superstition.

Ten thousand children died in that camp.

As you read this, Australian business owners are similarly shaking their heads. They cannot accept as genuine a person who avoids returning to work after an episode of back pain, or after an exchange of insults in the workplace.

Into this darkness, ergonomists cast no light. They stand up and talk numbers, “proving” mathematically whether or not the job is physically reasonable, and whether or not the person should go back to work without further complaint.

So the ergonomist has been part of the problem. To become part of the solution, ergonomists as a profession need to embrace the subjective world, to explain “germs of the mind” in ways that people can understand.

This paper aims to provide ergonomists with basic navigation around the subjective world, to show how the inner and outer worlds meet. It begins with the occupational overuse problems (“RSI”) of the 1980’s, and ends with the present-day problems of pain, fear and stress.

“RSI”: Where inner and outer worlds meet

Let’s picture ourselves in the early 1980’s. “RSI” has (apparently) just arrived on the scene, and physiotherapists, doctors, psychologists and other professionals rush to be the first to solve the problem.

What is this “new disease”, and why is it here? The first idea, as suggested by the name, is:

<table>
<thead>
<tr>
<th>Low repetition</th>
<th>High repetition</th>
</tr>
</thead>
<tbody>
<tr>
<td>No RSI</td>
<td>RSI</td>
</tr>
</tbody>
</table>

But how much is too much? And how do you account for people who aren’t doing much repetition but still “get RSI”? Perhaps you add a chair to the equation:

<table>
<thead>
<tr>
<th>Good chair</th>
<th>Low repetition</th>
<th>High repetition</th>
</tr>
</thead>
<tbody>
<tr>
<td>No RSI</td>
<td>Maybe RSI</td>
<td>RSI</td>
</tr>
<tr>
<td>Bad chair</td>
<td>Maybe RSI</td>
<td>RSI</td>
</tr>
</tbody>
</table>

That adds a new problem - how much chair badness is the equivalent of how many repetitions?

The problem compounds with every new factor added. Soon the problem is caused by work rate, chairs, desks, supervisors, management, troubles at home, being unfit, keyboards that are too light, keyboards that are too heavy. We might represent these theories in Figure 1:
It makes a good graphic, but there is no practical action that you can take based on Figure 1.

According to Thomas Kuhn (1962), science often has times like this. Theories start simply, then special rules are added to deal with issues that the original theory can’t quite cover. In time, theories become so complex that they are unuseable, and they are then overthrown.

In retrospect, although nobody thought of it this way at the time, the revolution was to introduce the subjective, which crept in under the name of “muscle tension”.

So a chair is a problem if and only if it makes you tense. Of course, doubling the tension doesn’t really double the discomfort, but the “equation” gives, broadly, the right feel for the topic.

There was no outcome to measure in Figure 1 other than injury rate, but in Figure 2 we can measure muscle tension using electromyography or “EMG”. That EMG biofeedback noise and meter reading makes a very strong
impression on the audience, convincing workers of the need to adjust their workstations and to work well, and convincing managers of the need to provide appropriate tools and work / break regimes.

It is, of course, a “con”. An effective con-sultant con-vinces people to change, and gives them con-fidence in the recommendations made. You need theatre, drama, otherwise you won’t get behaviour change in workers, and you won’t get decisions made by managers. The consultant needs to say confidently “This is important, that is not!” and people need to believe it.

The purely “scientific” ergonomist who hedges their bets and tries to list every possible factor is impotent by comparison.

The muscle tension approach was nothing short of a revolution, and it took a while for people to adapt. An example. The author was taking part in an “RSI intervention” in a government department, training supervisors to help work-ers to relax as they work. A visitor remarked, “It’s so different here. In Melbourne we tense up when the supervisor comes near, because we know we’re going to be yelled at about our posture!”

By 1985, the revolution was virtually complete, in Australia at least. After hundreds of conference appearances, along with TV, radio, newspaper and workshop presentations, these once-radical views about muscle tension and “RSI” were being rated as “mainstream”. Although worldwide muscle research continued through the years, and the “acceptable level” of sustained muscle activity reduced from 15% of maximum voluntary contraction down to just a few percent, the central concept (that sustained tension hurts) did not change. So intervention remained targeted at reducing tension, at reducing the time for which tension was held, or at doing a little of each.

The muscle tension approach opened a world of practical applications. We could test a proposed change to a work process in a few hours by measuring its effect on muscle tension with several work-ers using cross-over designs. This was a much more practical approach than introducing a change to a whole section of workers and waiting a year to count the bodies. We could also work therapeutically with individuals, and have immediate feedback as to the expected outcome.

Using muscle tension as the central idea gave us a vast impetus. But its biggest benefit was unexpected – it opened a door into the emotional realm.

How muscle tension lets us talk about the subjective

When we began to use EMG in occupational settings, we had no detailed information about how EMG had been used by others (apart from electrode locations), so we developed our own protocol. The author, a psychologist, had used EMG for a decade in relaxation training, and that relaxation-focused approach slipped in without anyone realising. It was a lucky accident.

We knew that people expected the solution to be found in workstation adjustment, so we began there. We used EMG to prove the value of raising the chair, then we built on that success - “did you notice that when you do it that way, it makes your shoulders as tense as having your chair at the wrong height? Can you think of a different way to do it?” Next we showed the worker how to take an effective micropause, and practiced it until they could quickly reduce their EMG readings for trapezius and forearm extensor muscles to a very low level. Finally, we asked – “is there anything else about work that makes you feel tense?”

Discontinuity - the slippery slope

It’s an ergonomics truism that late interventions are more difficult. So years ago, we drew a diagram showing a man at the top of a slippery slope of pain. It was easy to pull him back from the brink, but once on the slope he would probably slide rapidly downhill, and you would have quite a job to get him back up again. Figure 2 does not show the slippery slope. Perhaps it should have one, like this:
Is pain a particle, or a wave?

Now our “RSI” diagram is dual in nature. There is a “mathematical zone” where fatigue is the issue, resulting from tension sustained over time. In that zone, a degree of precision can be achieved with the intervention and the result. But there is also a discontinuous zone, where unpredictability rules; the person slides rapidly downhill and it is not always easy to get them back. We don’t even know where they went – is the problem physiological or psychological, or how should we think about it?

Fortunately, some progress is now being made with the idea “fear of re-injury” which will be discussed in detail later in this paper.

This same dual-nature approach is needed when discussing occupational stress. Most of the problem is easy, but some of it is extremely difficult!

“Stress”: applying the lessons from “RSI”

In 2002, we are in the same position with “stress” as we were in 1982 with “RSI”.

- Most articles about stress provide unorganised long lists of contributing factors – work rate, supervisor style, physical stressors, and so on.

- Important and unimportant things appear in the same list.

- The central factor through which the contributing factors operate is either not shown, or it’s told as a joke – “you’re experiencing the fight or flight reaction, just like a caveman”.

- The consequences of stress are expressed in dire physiological terms, for instance the “Alarm – Resistance – Exhaustion” model of stress proposed by Selye (1950).

Figure 4 shows the model of stress that the author has been developing since 1978. Obviously, it is meant to avoid the errors listed above. The central factor follows the pattern “adverse effect = exposure x time”. This is a fundamental pattern of occupational health; it appears in the “muscle tension x time” model of muscle pain as shown in Figure 2, in the “noise x time” model of hearing loss, and in the “radiation x time” model of burns and radiation poisoning. Similarly to Figure 2, the multiplication sign is not meant to be taken as literal simple multiplication. The necessary “slippery slope” will be added a little later.
This model has a number of sources.

- The “Attention” section is a development the author’s Masters Degree work (1978). It is partly based on a model of attention presented by Carl Pribram (1975), and partly on a series of relatively unknown experiments carried out on animals by Jay Weiss (1970). Masterfully, Weiss laid out the parameters of a task that led to stress in an “executive animal”. The author translated these parameters into descriptions for human tasks (Table 1).

- The section on “Fear” comes from the author’s work in “post traumatic stress disorder” (Brown, 2000).

- The “Frustration” section comes from behavioural research on animals, together with the author’s observations of people in the workplace.

- The “Bad feelings” section comes from the literature on heart disease and personality, and on the role of status struggles in disease across species.

These four sources of “stress”, although subjective, are easily understood. You can feel them, and you can feel the “emotional fatigue” through which they operate. The author has found that most people, including teenagers, can relate to the concept and give examples from their own life.

Compare that to the Karasek and Theorell (1990) model. It is very hard to get a “feel” for their concept of control as “decision latitude”. This abstractness problem is common in concepts arrived at through studying large groups; the computer throws out a “factor” and the researcher has to find a way to explain it in words. Whereas the feelings associated with each of the causes in Figure 4 are familiar and recognisable.

There are many structuring tools (lists, tables, calendars, flow charts, planner charts etc); spend some time to choose the most appropriate tool for your work.

Figure 4. Four causes of stress
Table 1. Attention demand arising from work

<table>
<thead>
<tr>
<th>Cause of fatigue</th>
<th>The solution is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast pace or short reaction time: Decisions or responses are required rapidly</td>
<td>Reorganise things so you have more time to respond. For instance when driving in traffic, leave a bigger space to the car in front. See Threat avoidant vigilant activity (TAV) - Belkic (1992). Take a fixed break (even a few seconds helps) between decisions. For instance if you’re answering the phone a lot today, let it ring for 4 rings and not 3, and relax during those few seconds. If people are queuing at your door to speak to you, devise a ‘pause tactic’. Finish your notes, then close your notebook or put that folder away. Take several deep breaths, get up and stretch as you walk to your filing cabinet.</td>
</tr>
<tr>
<td>Duration: Decisions are required one after another without a rest in between, or task goes for a long time</td>
<td>If the job goes for very long periods, try to find natural places to break it. Or invent them! (See ‘Lack of completion’ later in this table) If fast-paced decisions are unavoidable, or if the job doesn’t have natural breaks, schedule breaks or rotate jobs so that no one person does the job for too long. If you’re in charge of staff, ensure that everyone knows when their task is finished.</td>
</tr>
<tr>
<td>Lack of clarity: The task is unclear or person is new</td>
<td>Everyone needs to have the same understanding of what the job entails, especially of what the boss means by a ‘properly finished job’. It’s annoying to finish something and hand it over, only to have it come right back at you! If your boss hasn’t done this for you, take responsibility and ask him/her “what do you see as the finish point to this job?” or “can I have some clear guidelines as to what the finished job will look like?”</td>
</tr>
<tr>
<td>Lack of completion: The job never really finishes, so we can’t relax.</td>
<td>Here I’m talking about the feeling of completion, which is just as important as actually finishing. Finishing a task brings spontaneous physical, mental and emotional relaxation only if we know that the task is finished. So clarifying the end point of a task is very important. You need to be able to feel that you have completed one task before starting another (even if that just means putting the first task away and coming back later, rather than leaving it open on your desk). Reduce interruptions where possible, to allow one task to be finished at a time. If you’re always being interrupted, taken off one task and put onto another, or if the end point of the job is unclear, you can’t get the satisfaction of completion, and you are more likely to feel frustrated. Talk to your boss.</td>
</tr>
</tbody>
</table>
It is probably obvious that just like the "RSI" model of Figure 2, the "Stress" model of Figure 4 offers straightforward interventions for attention demand –

- Reduce the amount of attention, or
- Reduce the time for which it is held,
and the person will experience less emotional fatigue.

The second major cause of stress shown in Figure 4 is "Fear, which is maintained through avoidance". This problem occurs commonly after occupational injury, but is rarely diagnosed. Obviously it has similarities with "post traumatic stress disorder", but in the author's view, the standard DSM-IV system for classifying that disorder is faulty (Brown 2001). Instead, the author proposes two key causal paths, shown as A and B in Figure 4 (which is derived from Figure 4):

**Causal path A: Fear, vigilance, avoidance** - learned in the body, this consists of an emotion (fear) usually linked to an action (avoiding or running away); see arrow A in Figure 5.

Fear is conditioned and unthinking, its entire purpose is to keep the person safe by running them away from the thing that hurt them. If fear has "generalised" (arrow A1), the person might also be vigilant, because the next threat could come from anywhere.

Treatment is by exposure to the feared thing or place or event, staying there for an hour or more and not running away. Repeat once or twice if necessary. Detailed examples of exposure will be given later in this paper. If the therapist doesn’t use exposure, if they simply talk about the problem, the person is unlikely to get better; so a therapist needs to be prepared to get out of their chair and go to the place where the trauma occurred.

<table>
<thead>
<tr>
<th>Cause of fatigue</th>
<th>The solution is:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High complexity:</strong></td>
<td>Arrange interruption-free periods for complex tasks. Schedule them at times when your mind is clearest.</td>
</tr>
<tr>
<td>The task is complex and we’re not</td>
<td>Try to subdivide or otherwise clearly structure complex tasks, so that they can be finished in parts.</td>
</tr>
<tr>
<td>equipped to finish it; or our strategy is wrong and we can’t make progress;</td>
<td>If you’re running too many tasks at once, close some of them down (even just putting them in a box and out of sight helps; or ask if someone else can do them).</td>
</tr>
<tr>
<td>or we’ve got too many tasks running at once</td>
<td>If you can’t work out the steps to finishing the task, don’t be shy, ask for help!</td>
</tr>
<tr>
<td><strong>Lack of control:</strong></td>
<td>If you’re doing the job, you need to be able to control it. You at least need access to the on/off button!</td>
</tr>
<tr>
<td>We can’t control what we do or when we finish</td>
<td>Too much responsibility doesn’t always help – but in most cases, control is healthy.</td>
</tr>
<tr>
<td></td>
<td>If you can’t have control, then you need breaks. For instance ask your boss about breaks and staff rotations.</td>
</tr>
<tr>
<td>(note: high control is linked with high status, and that also protects against stress if the social rank is stable)</td>
<td></td>
</tr>
<tr>
<td><strong>Severe consequences of error:</strong></td>
<td>If a mistake costs a dollar, the job will be much less “stressful” than if it costs a million dollars.</td>
</tr>
<tr>
<td></td>
<td>So why not reduce the consequences of error?</td>
</tr>
</tbody>
</table>

It is probably obvious that just like the "RSI" model of Figure 2, the “Stress” model of Figure 4 offers straightforward interventions for attention demand –

- Reduce the amount of attention, or
- Reduce the time for which it is held,
and the person will experience less emotional fatigue.
A therapist needs to be resilient in order to perform this treatment. It is difficult at times to be with a person who is distressed confronting their fear. You need confidence that the treatment will work! Of course, grade the exposure in tolerable steps.

A therapist also needs to tolerate unusual reports and consider them to be a normal part of treatment. During a recent exposure treatment, a woman looked at a now-empty street where she had been robbed, and told the author that she could “see” her car. This is one type of “flashback”. After an hour of exposure, she said that this “ghost car” had now disappeared. Other workers have made similar comments about seeing things that are not there. It is as if the past is overlaid on the present, but when treatment is complete, the past is laid to rest.

**Causal path B: Bruised status and lost values** – Feeling put down or diminished; constantly reliving the event, trying to make it come out better (arrow B in Figure 5).

I feel that my control over my life has slipped. I might take legal action simply in order to prove that I am a worthwhile person after all.

For most people, bruised status eventually heals. Treatment can make this happen more quickly, particularly if the reaction is being sustained by repetitive thoughts about the event.

The author was held up at gunpoint as a student, and spent a year reliving the event. The “flashback” consisted of the author imagining how he could have overpowered the armed gunman and his two accomplices. In retrospect, any sensible person could have told the author not to be such an idiot! More formally, the technique called “thought stopping” would have brought that type of “flashback” to an end in about three days, compared to their sorry duration of a year.

Repetitive thoughts not only result from trauma, they can result from virtually any event in the workplace. Being overlooked for promotion might be enough. A typical “stress patient”, when asked by the author “How often do you have these thoughts?” replied “From the moment I get up in the morning until I go to bed at night I can’t stop thinking about how badly I was treated.” In an identical expression from a different culture, demonic possession in Haiti is described as “the spirit dances in the head of the possessed person”. In each case, thoughts unbidden go round and round, causing bad feelings (Figure 6).

For the past ten years, the literature on heart disease and personality has focused on the role of cynical hostility (“the world is out to get me”) and hyper-reactivity in the development of coronary heart disease. Basically, cynically hostile people are always over-reacting in social situations, even though their reactivity in other situations is often normal.
The good news is that a pet dog helps these cynically hostile people, at least while the dog is around (Allen and Blascovich (1996)). The bad news is that cynically hostile people are more likely to disregard parts of a doctor’s advice (Christensen et al (1997)), putting them even more at risk of adverse health outcomes. Add the fact that sustained bad feelings have a clear negative health impact (Jonas and Lando (2000)), and these people are in real trouble!

Figure 6 might also explain why the “effort-reward imbalance” stress theory of Siegrist (1996) achieves some positive research results. An effort-reward imbalance sounds like an objective, almost physical thing; it sounds as if person will be stressed if they are not paid enough, or recognised enough, for the work that they do. But the test actually appears to measure the same cynical hostility that is such an issue in heart disease research.

That is, it measures (at least in part) the person’s bad reactions to their situation. So the “effort-reward imbalance” theory, which sounds so grand and objective when you first hear it, really means “I feel put down” or “I feel powerless” or “I feel trapped in a dead-end job” – “and I can’t stop thinking about it, or feeling that way, I hate you for putting me here”.

Personality research suggests that people who readily think that way are different to the more easy-going among us; so the “effort-reward imbalance” test could be a roundabout personality test, and not really a test of workplace stress.

A similar confusion of the internal and external worlds occurs with Karasek and Theorell’s concept of “control” as protective against stress. They propose it as a characteristic of the job. The author, however, views it as having two components, one external and one internal – the first being the ability to complete one piece of work before commencing the next, which relates to attention; the second being one’s self-perceived place in a social hierarchy, which relates to bad feelings.

In Figure 5, for some people the wound of bad feelings is deep, their place in life (i.e. in the status hierarchy) can’t be restored, and the problem becomes “lost values” (arrow B1). The world no longer makes sense, no longer seems “right” or “fair” or “safe”. “They shouldn’t have done that, it was wrong, nobody should treat anyone else like that.” Some people who weren’t religious before gain a belief in God, while others who were religious before lose their faith – “how could a loving God let this happen?”
Losing your values is the discontinuity in the stress model, the equivalent of the slippery slope of pain in the “RSI” model. Your old world has turned upside down, it no longer makes sense.

It’s rather like flying an aircraft. There is an “envelope” of stability, within which things can be predicted and managed. Go outside the envelope, however, and things will become rough and unpredictable – buffeting, spins, stalls, inversions, all sorts of “irrational” behaviour.

Losing one’s values is a developmental challenge that only some people manage to grow through. That is why the B1 arrow takes you right off the map in Figure 5.

For instance, a person who’s lost a child in an accident might only heal their fear of cars through exposure to the scene of the accident. They grieve for their child, but perhaps they also grieve for their loss of innocence, for the loss of a stable and predictable world in which everything is fair and right. There has to be someone to blame. Let’s find them and sue them. Because few people can cope with the realisation that the world is not a fair and predictable place.

There is another possible outcome of trauma that should not be considered “post traumatic stress disorder” at all. After a trauma some people experience recurrence of earlier, apparently healed psychological problems. Referring them back to their original counsellor is probably the best course of action.

The remaining circle in Figure 4, frustration, is straightforward. Frustration means banging your head against a wall – you’re taking the wrong approach to the task, for instance, you’re trying to do a complex job on a day when the phone keeps ringing. Silly you.

**Why this stress theory uses everyday language**

The author’s stress model has deliberately been presented in everyday language, without jargon, so as to allow readers to relate it to their own experience. That also allows it to be connected to historical understandings about stress that remain in our culture, and which can be found in folk sayings. Table 2 shows how folk sayings can be related to psychological findings, and then to courses of remedial action:

The next section deals with pain, and in particular the question of why a person will not return to work even though their own doctor has said that they are medically capable of doing so. The similarity with stress, and the role of the subjective, will quickly become apparent.

---

**Table 2. Folk wisdom about stress**

<table>
<thead>
<tr>
<th>Grannie says</th>
<th>Same thing said by a psychologist</th>
<th>What you need to do</th>
</tr>
</thead>
<tbody>
<tr>
<td>All work and no play makes Jack a dull boy.</td>
<td>Sustained attention is unhealthy.</td>
<td>Don’t try to do ten things at once - focus instead on completing things.</td>
</tr>
<tr>
<td>The job is its own reward.</td>
<td>When we finish something, relaxation comes by itself.</td>
<td>Structure your work into “chunks” that you can finish, e.g. in 1-2 hours per chunk.</td>
</tr>
<tr>
<td>Stop banging your head the wall</td>
<td>Frustration is a useless emotion.</td>
<td>If you’re feeling frustrated, stop and take against a break. If necessary, attend a coping skills course to recognise and deal frustration more quickly.</td>
</tr>
<tr>
<td>Get back on the horse</td>
<td>You can’t get over fear by running away - you have to face it.</td>
<td>Confront your that threw you.fears. Go to the feared place or situation. Stay there for an hour or more and don’t let yourself escape. A psychologist can help.</td>
</tr>
<tr>
<td>Never let the sun set on an argument.</td>
<td>Reactions that go on and on can harm your health, so make peace as soon as possible.</td>
<td>Meet with the person who offended you. It’s usually best to seek the assistance of a peacemaker (mediator, wise person), particularly if the problem is longstanding.</td>
</tr>
</tbody>
</table>
Bad feelings, attention, fear and pain

Many people with nothing diagnosably wrong with their back claim to be permanently crippled, while others with clear spinal problems are coping well. This mystery has annoyed employers, employed investigators, and intrigued researchers for years.

Since 1997 articles have been appearing on the role of attention and fear in pain. This accumulating body of work is beginning to make sense of the disability puzzle. The following is a sample of that work.

How pain disables

Crombez, Eccleston et al. (1998) divided a group of healthy people into “catastrophisers”, meaning people who think to themselves “this will be unbearable”, and “non-catastrophisers”, and gave everyone a task to perform that involved a mild shock. They found that if they warned subjects that a painful shock was coming, the performance of catastrophisers fell even before the shock arrived.

In 1999 they added that pain interrupts more if the person is more afraid of pain in general. You don’t have to be afraid of that specific pain – it is your general view of pain that is important.

Crombez, Vervae et al. (1998) looked at coping styles. They reported that chronic pain sufferers who avoided pain reported greater frequency and duration of pain, higher fear of pain and injury, more disability in daily living, and more attention to back sensations, than chronic pain sufferers who confronted pain.

Crombez, Hermans et al. (2000) reported that the more pain a person is experiencing, the more their attention tends to be caught by words that are related to pain. This shows that the pain problem is not just at a sensory level; higher levels of the brain are also involved.

Eccleston, Crombez et al. (1997) found higher disruption of performance in those who reported high somatic awareness generally, and high negative affect.

Hadjistavropoulos and LaChapelle (2000) studied patients undergoing medical examinations, and found that catastrophic cognitions, behavioural displays of pain, and somatic sensations measured during examination predicted anxiety experienced during examination. It suggests that if a person stopped their catastrophic thinking and stopped making big displays of pain, they might feel less anxious.

Putting the above findings together suggests that pain experience runs in a loop, in which the more pain a person is experiencing, the more they attend to it, and the more their attention becomes focused on pain issues in general (and not just on the pain they are experiencing at the time). A tendency to catastrophise, fearing or expecting pain, and having bad feelings, makes the whole situation worse. Then just when things get unbearable and you try to escape, ie to avoid pain, you find that you can’t, and you’re back at the beginning again.

Aldrich, Eccleston et al. (2000) suggest that we think of chronic pain as chronic vigilance to threat of pain. They argue that chronic pain is the result of the entirely normal tactic of problem solving, where the problem is “How can I escape from pain?” Because the problem cannot be solved, the vigilance can never come to an end. (That formulation is rather similar to the author’s view of stress; see Figure 5, substituting “Pain” for “Horrible experience”)

Crombez, Vlaeyen et al. (1999) reported a number of studies that concluded that pain-related fear is more disabling than pain itself. Vansteenwegen, Crombez et al. (1998) found in a study of normal subjects that experimentally-induced fear of pain could be extinguished if the pain did not recur, however the person remained alert to the situation that had initially caused their pain.

Consistently, Mannion, Muntener et al. (1999) studied the effectiveness of physiotherapy, muscle training machines, and aerobics as treatments for pain. They concluded that the main therapeutic effects did not come from reversing physical weaknesses, but perhaps worked by reducing fear of pain, and increasing confidence about ability to perform.

This concept “fear of pain” might turn out to be a breakthrough. The author has discussed the idea with many people, and they immediately acknowledge it as something which was never said but was always true.

So there might be two kinds of fear - fear of the place where the injury occurred, and fear of recurrence of pain as explained by Crombez and Vlaeyen. We might expect that in some cases one will predominate, in other cases the other.

How to treat fear of the place where injury occurred

As promised earlier in this paper, this section will give details of the author’s approach to treating fear of a thing, place or object - the classic behavioural technique of graded exposure.

Successful treatment of fear can only be done if the worker agrees not to escape, and not to avoid, that which they fear. Humane treatment requires that the exposure be conducted in steps which are tolerable to the worker.
If a person is afraid of a place, their fear increases the closer they approach it. This provides an easy way to stage treatment, as well as an objective measure of the person’s progress. If they can tolerate looking at the machine from 50 metres away for the first half hour, but for the next half hour they can tolerate being 30 metres from it, you have made measurable progress.

This process is usually very quick, and the author has completed a number of cases in a single one-hour session, even when traumatic injury (such as a shooting) was involved. In the case of a security guard who was shot on duty, we spent 45 minutes sitting on a park bench opposite the bank. When the worker said “I’m starting to feel quite different”, we waited another ten minutes, then walked across the road. The worker then described the shooting in entirely matter-of-fact terms; it was clear that the intense emotion that he had been feeling had been largely resolved. It was now just a memory.

When on-site exposure is impossible, use simulation

In a current case the author found that the worker kept looking at the floor during exposure sessions, and not at the machine on which she had been injured. This was effectively avoidance, and would maintain her fear no matter how many sessions were given. It turned out that two fellow workers with whom she had previously had a dispute were standing nearby, smirking. So the author made a 10-minute videotape of the machine, which the worker viewed every workday in a private room without the knowledge of the other workers. Observation of the worker across several sessions showed that she was looking at the TV screen more and more as the days went on. After two weeks the worker reported that she could view the actual machine from a close position with much less anxiety than before.

Treating fear of the task

The author recently conducted exposure treatment on a computer operator who was refusing to touch a keyboard following an injury. Graded exposure away from the workplace included disassembling a keyboard, asking the worker to look at and handle the components, then reassembling it. The worker showed no distress dealing with this keyboard while it was not plugged into the computer. So there was, apparently, no fear of the keyboard itself.

The author then went with the worker to the actual workplace, but the worker insisted that even a dozen keystrokes in a day would injure her. She would not touch the keyboard, and when asked to, she roughly hit at it from a distance. She then refused any further contact with the author.

Reviewing this case in light of the research discussed above, catastrophic thinking was clearly a key factor; the worker had repeatedly spoken of her fear that her previous condition would recur or worsen. High somatic awareness was also a factor; she repeatedly drew attention to the appearance of her arms (in fact they looked normal). She avoided, rather than confronted, pain. But there were many additional complications, including a psychiatric history that the worker refused to discuss.

There was no way to access her inner world, the door remained firmly shut. All that can be done in those cases is to manage “from the outside”, for instance:

• Give a clear expectation that return to work is normal even if some pain remains;
• Explain that it is normal to feel reluctant to perform that task again;
• Reassure that the process will be done in tolerable steps;
• Follow the plan, and measure the results in terms of approach to the feared work area, or in terms of time spent on the feared task.

Summary of pain research

A few very important issues emerge from this research:

• Fear is likely to play a key role in return to work difficulties.
• If you expect severe pain from an activity, you’ll be more disabled because pain will take more of your attention; if you catastrophise about pain, it makes things even worse; if you express pain, it makes you feel bad.
• Chronic pain might be redefined as “always fearing, avoiding and trying to escape from pain”. People with long-term pain do better if they abandon this tactic and confront their pain instead.
• Fear of the place where injury occurred is easy to treat, fear of the task can be harder.
CONCLUSION
As a rule, ergonomists love measuring things, talking numbers and naming muscles, listing contributing factors and making recommendations. While all this is going on, the essence of the worker is somehow forgotten.

We need to include the subjective world of the worker in our understanding. That subjective world has its complex and unpredictable zones, but it also has places that are easily understood. Hopefully, the ideas presented in this paper about the nature of stress, pain and fear will be a step towards that understanding.

REFERENCES
Brown D (2001). If DSM-IV doesn’t work, let’s try something different. British Medical Journal eletters #15537 (note: eletters are not classed as a publication)


About the author:
David Brown qualified in physics (Bachelor of Science, Sydney University 1972) and psychology (B.Sc. 1972, Master of Science (Qualifying) 1973, Master of Arts 1982, Sydney University). He has practiced in occupational health, safety and rehabilitation since 1980. He is registered as a psychologist in NSW, and is a full Member of the Ergonomics Society of Australia.

Forum

Possible ESA Name Change

I would like to add my congratulations on the new format you introduced for Ergonomics Australia. It is a terrific new innovation and presents a much better image of the Society as a professional organization. Speaking of image, I would like to add qualified support to the change of name canvassed by Verna Blewett.

Working in the government sector, I am normally very cynical about the change of name of organizations. Frequently the only thing it seems to accomplish is a major stationary bill and identity confusion. For the Ergonomics Society, however it does offer the opportunity to develop a name that has more of an impact in the community. That would be a very valuable reason for paying the cost of change. I don’t see the need to change for professionals working in areas associated with “ergonomics”, either internal or external to the society. For me however it is the only reason. For people who know the field, I would be very skeptical that a change of name would make much of a difference as to whether they joined the Society or not. Where it would make a difference is attracting interest for people who do not know the areas in which we are involved. My judgment is that the name “human factor” is more attractive than “ergonomics” because it has the “human” word in it. Hence I would feel that the change of name would be good from a marketing point of view.

This of course is a marketing argument for which I would not claim expertise. My qualification to the support for the name change is that we link this in to a marketing plan for which we gain professional support. Coincidental to Verna’s letter was the letter from Mark Dohrmann asking where the PAB ‘s marketing plan is. Marketing plans have been around the Society for the past 7 years since I have been involved. None really have been followed through. I don’t believe that to be lack of diligence from those involved. I think the message is that we need to provide the resources to gain professional marketing support and expertise rather than treating it as something that will happen from volunteers who naturally have limited time and resources. I would suggest that we need a budget of $20,000 per annum to hire someone with professional qualifications for 2 days a week to help us prepare and implement a professional marketing plan that will work.
It would be useful to seek the advice of this marketing professional before changing the name. Assuming it will assist us with our marketing, I would strongly support the name change. Should we not link the name change to a strong marketing program, however, I would feel that the value of the change would be much more limited, and my support would be more lukewarm.

Tim Upsdell
South Australia

Many thanks to Verna Blewett for opening up discussion regarding a possible name change for our Society.

The relative merits of the terms ergonomics, human factors and others were widely discussed some years ago prior to the US society changing its name from the Human Factors Society to the Human Factors & Ergonomics Society. It now appears we have reached that point. One viewpoint about name change then (and probably now) related to the already established acceptance of each of the alternative terms and the risk of confusing the community (whomever that might include) by changing names. Others took the view that it didn’t really matter, as long as a choice was made and adhered to so that we could all move on to more important matters. A third line of thought which was split into more than one camp preferred (as I recall) to defer to historical precedent by adopting the terms used by their favoured progenitors.

Given that both the predominant terms – “ergonomics” and “human factors” – are far from being well understood by non-practitioners, and both suffer what many inside the profession would regard as inappropriate usage, none of the above seem particularly compelling reasons for, nor do they offer strong objections to, any particular choice. Currently, the IEA definition of “ergonomics” (adopted by the ESA) implies that it is interchangeable with the term “human factors”.

We may be better served by casting aside preconceptions, determining what these terms, in themselves, most logically and obviously reflect and then moving forward to promote this through clear explanation and education. Explanation and education, however, are always easier when the subject has a sound basis. Making an arbitrary choice for one, the other, or both terms in order to simply move on risks ongoing misunderstanding if that choice hasn’t emerged from logical and coherent reasoning. I’m the first to accept that the meaning of words change over time, or words are adopted to other than their original purpose, and that it is often not useful to waste debate on what is the “correct” meaning for a word when its usage in a particular way has gained wide acceptance. However, in this case, where semantic confusion or debate arises, etymology is a sound starting point for resolution.

Consider “human factors” – a “factor” is that from which something else is made; an element. The Oxford Dictionary defines “factor” as “a circumstance, fact or influence contributing to a result”. In mathematics, it refers to one of the components of an interaction that produces a result (the product). Hence, “ergonomics” (the study of the “natural laws of work”) is not equivalent to “the (human) circumstances, facts or influences contributing to a result”, i.e., “human factors”. At least four implications emerge from this simple exercise:

1. There is little logical or semantic basis for considering “human factors” to mean the same as “ergonomics”.

2. The above meaning for “human factors” quite clearly accords with what ergonomists frequently describe as “the characteristics, abilities and limitation of humans” taken into account when practicing ergonomics.

3. There must, by definition, be something else which interacts with the “human factors”. That something, too, is familiar to us all – those non-human elements or factors (a cumbersome term – perhaps “design factors” is better) with which humans must interact and which we seek, as practitioners, to shape so that the product of the interaction (i.e., the system) is productive, safe, and otherwise satisfactory.

4. There is nothing inherent in the above to suggest that one cannot simply be concerned with knowledge of “human factors” per se, without concern for its application. Indeed, a considerable proportion of the research published in overtly ergonomics/human factors literature, as well as related literature which makes regular (or occasional) reading for practitioners and researchers in our discipline (e.g., biomechanics, medicine, psychology, human movement science, sociology, etc.) reflects concern with human characteristics, abilities and limitations largely in isolation from their practical application to system design. Such research is most certainly about “human factors” but not necessarily about “ergonomics”.

Where does that leave the term “ergonomics”, i.e., the concern with the “natural laws of work”? Taking (as we should) the broadest definition of “work” to be any productive human activity (occupational, leisure, domestic, etc.), ergonomics can then be readily thought of as the application of knowledge about both human and non-human factors to the design of work systems. We apply that knowledge effectively because of our understanding, arrived at via scientific study, of the “natural laws” of work systems, their operation, and the interactions of their elements. We have, through ergonomics science, exploited
this knowledge about the “natural laws of work” to develop ways of describing, measuring, analysing and controlling human work systems.

To summarise, “human factors” can logically be thought of as that body of knowledge about human characteristics which ergonomists use when analysing and designing systems. Human factors is part of (but not the whole of) the body of knowledge used by ergonomists in carrying out their work. When knowledge of human factors is properly applied to the design of systems, ergonomics is being practiced. Put another way, other disciplines can apply knowledge about other types of factors (e.g., engineering, economics, etc.) to system design; ergonomics is the application of human factors to design.

In light of the above, joint use of the terms “human factors” and “ergonomics” as descriptive of our disciplinary focus is neither tautological nor does it reflect either too broad a compass or a “catch-all” solution designed simply to appease. Use of both does reinforce the view that there is a difference between the two terms. However, this is an entirely appropriate distinction. Together, these terms – with their distinct but related meanings – encompass the primary interest of all those we would like to see as affiliated with our discipline and our professional society. That interest, in my view, is (or should be) the use of knowledge about humans (i.e., human factors) to design ergonomically sound systems – systems in which the fit between their human and non-human elements is optimised.

The advantages of a joint name, and particularly its formulation as the Human Factors & Ergonomics Society of Australia (HF&ESA) rather than the other way around, include the following:

1. it accommodates all those who see their disciplinary affiliation as being tied to one or the other term;

2. it retains the original and historically relevant term “Ergonomics Society of Australia” (or ESA) as an identifiable component, thereby both catering to our fondness for that term and minimising any potential confusion about name changes;

3. assuming acceptance of the arguments and distinctions presented above, it has a logical and rational basis and is thus defensible and readily explicable;

4. it includes the widest scope of activities across what currently are thought by some to be disparate domains;

5. it may considerably help us in overcoming the preconception held by some professionals that ergonomics is only about musculoskeletal injury and thus that our society is not suitable for their interests.

A further, overarching potential benefit is that both the diversity of our discipline as well as the commonality of its principles and goals across its various manifestations may be rendered more transparent. This, in turn, may facilitate greater interaction between the different sub-groups, increased society membership, larger meetings and conferences and, perhaps most importantly, enhanced profile and weight when debates arise and input is required to political and legislative processes.

Ergonomics as the application of human factors to design? Why not? It’s clear and simple. The Human Factors & Ergonomics Society of Australia (HF&ESA)? Why not?

Max Healy
New South Wales

Vol 16, Number 3, September 2002
Standards Representation

Dr Mike Regan, ESA Member and Past Chairman of the ACT Branch of the Society, was appointed by Standards Australia earlier this year as the Australian Representative on International Organisation for Standardization (ISO) Technical Committee 22, Sub-Committee 13, “Ergonomics as Applicable to Road Vehicles”. The committee develops international standards for the ergonomic design of road vehicles. There are 11 “participating” countries on the Committee, including Australia, and another 18 countries with “observer” status. Mike will provide input to various Working Groups within SC13, including:

- WG3 (localisation of controls and “tell tales”);
- WG5 (symbols for use on road vehicles);
- WG7 (hand reach and R and H point determination); and in particular
- WG8 (human machine interface of transport information and control systems).

Mike attended the most recent meeting of SC13 and its Working Groups which was held in Portland, Oregon, in June. SC13 meets twice a year, mostly in Europe. Mike is currently employed as a Senior Research Fellow at the Monash University Accident Research Centre in Melbourne.

Michael Regan, PhD
Email: michael.regan@general.monash.edu.au

International Conference Updates

The IEA 2003 Call for Papers is out - as many of you would be aware. The printed version has been sent in bulk to the ESA (I am trying to determine exactly where) but was a month or so delayed in the printing. Information can be found on the IEA Website www.iea2003.org, and the full version of the call for papers is at: www.iea2003.org/vod/fullversion.pdf

Important dates are:
- Proposal for symposium/workshop (outline only) 31 August 2002
- Abstract for technical session 31 October 2002
- Acceptance notification 31 January 2003
- Full paper submission 30 April 2003

Barbara McPhee

I would like to convey my sincere thanks for your interest in the XVth International Ergonomics Association Triennial Congress to be held in Seoul, Korea on August 24 ~29, 2003.

You may download the Invitation and Call for Proposals in a pdf file format by one click:
- 20-page full version
- 4-page short version

We will send a copy of the Invitation and Call for Proposals if you inform us of your mailing address.

The information is also available at the IEA 2003 homepage: http://www.iea2003.org. I cordially ask you to share this information with your colleagues who show interest in the IEA 2003 Congress.

I look forward to seeing you all in Seoul, Korea next year.

Min K. Chung
IEA 2003 Congress Chair

Abstract for Technical Sessions October 31, 2002
Acceptance Notification January 31, 2003
Full Paper Submission April 30, 2003

IEA 2003 Secretariat
Address : Hallym Bldg, 3rd Fl (ICEM)
#907-1 Daehi-dong,
Gangnam-gu, Seoul, 135-841, Korea
Tel : +822-552-8350
Fax : +822-552-8325
E-mail : info@iea2003.org
Website : http://www.iea2003.org
Conference Calendar

2002

15 September – 15 October 2002
3rd CybErg Conference — Ergonomics for Human & Community Development
For updates and further details:
http://cyberg.wits.ac.za
Andrew Thatcher (Conference Organiser)
018ait@muse.wits.ac.za

30 September – 4 October 2002
46th HFES Annual Meeting — Bridging Fundamentals and New Opportunities
Venue: Baltimore Marriott Waterfront Hotel, Baltimore, Maryland, USA
Important Note: New location and Dates (Previously 23-27 September in Pittsburgh)
Contact: HFES
P0 box 1369, Santa Monica, CA 90406-1369 USA
Phone: +1 310 394 1811
Fax: +1 310 394 2410
lois@hfes.org, http://hfes.org

14 – 17 October 2002
11th National Congress of the Indonesian Physiological Society and the 13th National Seminar on Physiology
Venue: Grand Bali Beach Hotel, one of the five star hotels in Bali, located on the beach at Sanur, Indonesia.
Contact:
Adnyana Manuaba
adman@denpasar.wasantara.net.id

27 – 30 October 2002,
International Federation on Ageing –
6th Global Conference
Maturity Matters
Perth, Western Australia
Host - Disability Service Commission Universal
Design Network
Sponsored – Department for Planning and Infrastructure
For more information contact:
Pip Daly Smith
pipds@dsc.wa.gov.au
Tel: 61 08 9426 9301
Fax: 61 08 9481 5233

2003

23 – 28 February 2003
27th International Congress on
Occupational Health (ICOH 2003)
Iguassu Falls, Brazil
Pre-Congress Course in São Paulo, Brazil: Noise induced hearing loss: updating knowledge & practice.
5 Pre-Congress Courses in Iguassu Falls, Brazil
2 Keynote Addresses: The challenge of equity in safety & health at work.
26 Topic related round tables: following keynote addresses.
70 Symposium Sessions
Contact Secretariat:
Av Candido de Abreu, 200 Galeria Sala 6, CEP 80530-902
Curitiba — PR — Brazil
T/F: +55 41 353 6719
http://www.icoh2003.com.br

Keynotes are Dr. Brian Peacock and Dr. Lynn McAtamney (now Lynn Barson). The theme ‘Putting research to work’ is intended to encourage practitioners to present well-researched work, and academics to present work with a practical application. We’ve put a Call for Papers brochure on the NZES website (www.ergonomics.org.nz) which gives a little more detail, costs & the like.

Contact:
David Tappin
President NZES
david.tappin@cohfe.co.nz
19 – 22 May 2003
7th Southeast Asian Ergonomics Society (SEAES) Conference & 4th Malaysian Ergonomics Conference (MEC) — Ergonomics and Design Innovations for Regional Prosperity
Kuching, Sarawak, Malaysia
Contact:
Halimahtun Khalid & Aida Velasco
General Conference Chairs
SEAMEC 2003
Email: seamec@unimas.my
http://www.idea.unimas.my

1 – 3 October 2003
7th International Symposium on Human Factors in Organizational Design & Management,
Aachen, Germany
Contact:
ODAM 7  Secretary
Bruno Kloubert M A
FIR — Federal Institute for Rationalization & Operations Management
Pontdriesch 14 / 16
52062 Aachen, Germany
T: +49 (0)241 4 7705 150
F: +49 (0)241 4 7705 199
E: kl@fir.rwth-aachen.de
URL: www.odam.net

24 – 29 August 2003,
15th Triennial IEA Congress 2003 — Ergonomics in the Digital Age
Seoul, Korea
Submission Deadline of Proposal for Symposia/Workshop Sessions Extended
Please be advised that we have currently extended our submission deadline of Proposal for symposia/workshop Sessions to October 31, 2002 due to the request of those who have not yet completed proposal submission.
Contact:
E-mail: papers@iea2003.org
IEA 2003 Secretariat:
Hallym Bldg, 3rd Fl (ICEM) #907-13 Daechi-dong, Gangnam-gu, Seoul, 135-841, Korea
Tel : +822-552-8350
Fax : +822-552-8325
E-mail : info@iea2003.org
Website : http://www.iea2003.org

2006
10 – 14 July 2006
IEA 16th Triennial Congress
MECC Congress Centre, Maastricht, The Netherlands
Contact:
Ernst AP Koningsveld
Congress Chairman
E: nvve@planet.nl
Information for Contributors

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E-mail: shanng@optushome.com.au

The deadline for issues in 2002:
- March edition = February 1
- June edition = May 1
- September edition = August 1
- December edition = November 1

Contributions
Contributions to Ergonomics Australia are always welcomed and encouraged. The activities, achievements, experiences, views and opinions of Members are always of interest. These can be in the form of letters, notices, notes, commentaries and articles.

Graphics (photos, illustrations, drawings, computer graphics etc) are particularly welcome and should be camera ready. Photos need not be black and white and negatives are not required.

The preferred form of submissions is via e-mail, either in the body of a message (short notices), or as an attachment (articles / letters). Files may also be mailed on floppy disc (or Zip disc if very large). Microsoft Word or Corel WordPerfect are the preferred formats (the new editor cannot transcribe MacIntosh files that are not in IBM type format.) Handwritten or hard copy submissions will only be accepted in exceptional circumstances as the Editor is not a trained typist, does not employ a secretary and her time is valuable!

Any inquiries about contributions should be directed in the first instance to the Editor.

Information for Advertisers

Inquiries
All advertising inquiries should be directed to the Federal Office of the Society.

Contact:
Ms Jennifer Allen
T: 02 6242 1951
Fax: 02 6241 2554
E-mail: secretariat@ergonomics.org.au
1.00pm - 5.00 pm Monday to Friday

Size
The finished page size of the Newsletter is A4 (210mm x 297mm)
Printed column sizes: 165mm x 225mm (double) 80mm x 225mm (single)

Advertising Copy
Must be camera ready and must arrive at the ESA Federal Office by the Copy Deadline Submission Date for the Edition in question.

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Mr Goro Jankulovski, Acute Image
Tel: 03 9381 9696 Mobile: 0414 605 414
E-mail: goro@acuteimage.com.au

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Pre-printed enclosures (leaflets, brochures) etc are welcome for inclusion with the Journal.

Enclosures should be pre-folded to fit inside the finished Journal.

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Address for mailing Advertising copy and/or enclosures
ESA Federal Office
Creeda Business Centre
Bradfield Street
DOWNER ACT 2602

Advertising copy and enclosure submission deadlines for 2002 are the same as for Contributions — 1st of month prior to publication

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Circulation
The Journal is published four times a year and is received by approximately 620 professional’s Australia wide working in the areas of ergonomics, occupational health and safety, and design.

Ergonomics Australia
On-Line (EAOL)

Advertising and sponsorship opportunities also exist in the electronic version of this journal (EAOL) which is managed by Dr Robin Burgess-Limerick at Department of Human Movement at Queensland University. It is downloaded by more than 100 Australian and International readers each week.

To view EAOL: http://www.uq.edu.au

Caveats
The views expressed in the Journal are those of the individual authors and contributors and are not necessarily those of the Society.

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Editor
Shirleyann M Gibbs PhD