

THE PROFESSIONAL ERGONOMIST

The Newsletter of the BCPE

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FROM THE PRESIDENT

The Board of Certification in Professional Ergonomics (BCPE) is not a professional society, with membership and services rendered to those members, such as the Human Factors and Ergonomics Society. Rather, the BCPE ('the Board') is composed of nine Directors and one Executive Director, and instead of having members, we acknowledge certificants. Certificants are individuals who voluntarily participated in a specific review system administered by their peers, in order to become individually 'certified', that is, recognized as possessing the educational background, knowledge, and skills commensurate with the practice of Ergonomics/Human Factors. Although the BCPE is not a professional society, the Directors and the certificants should be intimately involved in the trends and issues that face us as Ergonomics/Human Factors practitioners, especially as they relate to certification of individuals.

It seems that ergonomics receives more attention daily. Only a few years ago, when I talked of my work in the field of ergonomics, few people had even heard the term. Now, it seems that everyone has an opinion of what ergonomics is or isn't, what ergonomic application can or cannot accomplish, and whether ergonomics has a sufficient scientific basis to be used at all! The term "Human Factors" on the other hand, has remained less known. The increased awareness of ergonomics has led to several dilemmas within the field. One is the educational background and competence of those who claim to be "ergonomists". Another is the perceived need for outreach programs to correctly educate the public, other professional organizations, and the U.S. Government as to the roles, achievements, and issues

pertinent to the field of Ergonomics/Human Factors. In the latter case, as implied by the outreach initiatives in the strategic plan adopted by the Human Factors and Ergonomics Society, we need to let people know what we do and correct any erroneous assumptions they may have. Third, market demand has resulted in the creation of another level of practitioner. The BCPE has elected to proactively address the issues originated by these practitioners.

It is clear that many persons who claim to be cognizant of ergonomics are not aware of the breadth of the field of ergonomics. Instead, they assume that what we know as "industrial ergonomics" and the prevention of cumulative trauma injuries comprise the field in its entirety. As a result, other professional organizations have investigated ergonomics as a sub-specialty within their practice domains. Some of these organizations include the Industrial Hygiene Association, the American Society of Safety Engineers, the American Occupational Therapy Association, and the American Physical Therapy Association. In addition, other organizations have developed with the practice of musculoskeletal ergonomics being integral to the definition of their organization, such as the Medical Ergonomics Society, the National Interdisciplinary Committee on Health Ergonomics, and the Occupational Injury Prevention and Rehabilitation Society. For those individuals who do not view Ergonomics/Human Factors as an independent profession, but instead view it as an eclectic body of knowledge arising from several other fields of study, the influx of persons from other fields should not be a problem. After all, ergonomic knowledge, tools, and

Lt. Col Valerie Rice, Ph.D., CPE

techniques can be used and applied in many diverse areas. For those persons who view Ergonomics/Human Factors as a field of practice unto itself (as most BCPE certificants do), the inflow of practitioners from other fields is alarming. Not simply because of territorial issues, but because our own reputations and the safety of the purchasers of ergonomic services are at stake. When an individual declares him or herself to be an ergonomist, and performs a poor or incomplete ergonomic analysis and design solution, the respect and competence of all ergonomists comes into question. In addition, management may be led into a false sense of security, i.e. they may assume that all ergonomic issues have been addressed when, in fact, issues other than musculoskeletal risk factors may not have been addressed (such as cognitive, labeling, or inspection tasks). The lack of standardization of educational requirements in Ergonomics/Human Factors has resulted in an accreditation process being established by the Human Factors and Ergonomics Society (HFES). The trepidation regarding professional competence on an individual level has resulted in certification being an issue in the United States (BCPE) as well as in other countries (Center for Registration of European Ergonomists, CREE). The BCPE continues to work with other countries in this regard. The BCPE and the CREE have worked together and each recognizes the certification of the other. South Africa (ESSA) continues to work with Hal Hendrick to have BCPE designated as their "preferred provider" of certification services. HFAC/ACE (Canada) and JERS/HQL (Japan)

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recognize both BCPE and CREE as valid certification organizations, even as they develop their own programs. Thus, the educational background and competence of those who profess to be "ergonomists" have been and are continuing to be addressed.

In regard to outreach programs, Directors on the BCPE have made individual and collective efforts. Within this year, examples include a book chapter entitled *Professional Ergonomics Issues* by Dieter Jahns to be published in *The Industrial Ergonomics Handbook* (Karwowski and Marras, Eds., CRC Press, 1997); my own interview published as part of an article in *Work Injury Management*; a conference presentation at the "Work Injury Management Regional Conference - 1997" (May 1-3 in Kansas City, MO) scheduled to be given by Carol Stuart-Buttle; and permission (which has been given to the BCPE) to publish and market Dave Meister's text, *The Practice of Ergonomics*. Should any of you, as certificants, participate in local, national, or international outreach programs in which certification is an issue, please let us know.

As the knowledge level of the general public has increased, so has the demand for ergonomic analysis and intervention in a multitude of system arenas. In some cases, the demand has outstripped the supply of qualified ergonomists. In other instances, such as with the U.S. Army, Navy, and Air Force, and with General Motors, the need for a different level practitioner (from the current BCPE definition) has been identified. This need is not born in the lack of Master's or Doctorate degree professionals. The need arises from differing job and task demands. In some situations, this model of an alternate level practitioner has been implemented and these individuals are as proud of the work they do in ergonomics and as committed to competence at their level, as any Certified Professional Ergonomist (CPE) or Certified Human Factors Professional (CHFP). This situation is similar to that of other professions, who have defined roles, functions, and qualifying criteria for "para-professionals" or assistants, who work under the supervision of a fully qualified professional. We have the choice to either recognize this level and attempt to develop a mechanism of quality control (through certification) or to ignore it. If we choose to ignore this

existing level of practice, then either there will be no quality control or perhaps other professional organizations will seek to credential them (such as ASSE or AIHA). As noted in the last newsletter, the BCPE voted to investigate this other level of certification, which we are currently referring to as a Certified Ergonomics Technologist. This is not to be confused with specialty certification, as it is anticipated that certification requirements will include knowledge of the full breadth of Ergonomics/Human Factors, although with less depth than required of the CPE or CHFP.

In addressing each of these issues (individual competency, outreach, and differing levels of practice), BCPE is reiterating belief in Ergonomics/Human Factors as a unique field of practice. Even as Occupational Therapy is born of transdisciplinary knowledge from fields of medicine, anatomy/physiology, psychology, sociology, recreation, art, and anthropology, but retains a singular identification as a profession from similar professions such as Physical Therapy, so too does Ergonomics/Human Factors. We do not function merely as a sub-element of psychology, engineering, or medicine. Instead, we combine appropriate knowledge of systems theory, human characteristics, work analysis, and technology and apply it in a distinctive manner in order to create human-friendly designs in all areas in which

humans interact (work, recreation, home, transportation, education, and medicine, to name a few).

It is by endeavors such as these that we will continue to "define our edges" as expressed by Jerry Duncan (1996). Accomplishing the BCPE vision of "being a principal force helping to define and unify ergonomics as a distinct profession" can not happen merely by certifying qualified individuals. Instead it requires concerted effort by each one of us, as Certified Professional Ergonomists or Certified Human Factors Professionals, participating in our profession's development through educating germane constituents, assisting other countries in developing certification procedures, and yes, defining our field through the certification of qualified practitioners of differing levels.

Duncan, J. (1996, summer). Do we see our edges clearly? *The Professional Ergonomist*, BCPE: Bellingham, WA.

Jahns, D. (In press). Professional ergonomics issues. In W. Karwowski and W. Marras (Eds.), *The Industrial Ergonomics Handbook*, Boca Raton, FL: CRC Press, Inc.

Meister, D. (1997). *The Practice of Ergonomics*. BCPE: Bellingham, WA.

BOARD OF CERTIFIED SAFETY PROFESSIONALS (BCSP) DEVELOPING ERGONOMICS SPECIALTY EXAM

In a recent communication from The Board of Certified Safety Professionals' (BCSP), Executive Director Roger Brauer, PhD, CSP, PE, CPE notified us that "individuals who are CSPs and achieve the CPE (CHFP) credential gain 10 points in the Continuance of Certification program for CSPs." They can get 25 points for retaking the BCSP's *Comprehensive Practice Examination*. Secondly, the BCSP is continuing to develop an ergonomics specialty exam for CSPs. Now all candidates for BCSP certification must take the *Comprehensive Practice Examination*, and beginning early next year, there will be three specialty area exams available to be taken in addition. The specialty exams will be about 2 hours each, and do not cover materials included in the *Comprehensive Practice Examination*. The

ergonomics specialty exam will focus on areas of ergonomics applicable to safety professionals and does "not attempt to certify someone as an ergonomics professional in the broad practice of ergonomics. The certificate for the specialty will read: 'CSP with a specialty in ergonomics'". The BCSP expects to have the new specialty exams, as well as the BCSP *Comprehensive Practice Examination*, available through computer testing at Sylvan Testing Centers in early 1998.

While this "turn of events" may appear to dilute the practice of ergonomics, both BCPE and BCSP are trying to meet the credentialing needs of their constituents. The two organizations continue to cooperate in the cordial relationship which they have fostered since the mid-1980s.

1996 BCPE SURVEY RESULT

by Karel Jahns

The January 1996 survey was sent out twice last year (both times with a newsletter and the second time only to those who had not yet responded). Total responses received to date were 113 or 16%, a disappointing return. BCPE thanks those who took the time to respond to this survey. I will attempt to give you some feedback on results. In response to the question of whether there is a need for a "structure" to improve communication among BCPE

Certificants: 67 respondents said yes, 32 no, 3 undecided and 11 no response. Ideas for better communication frequently contained comments on

a) the newsletter (26) (compliments and/or the need for quarterly publishing),
b) an annual directory (14) (The certificant directory is published annually and is available for a nominal fee to cover our costs [Certificants pay \$19.95 and all others are charged \$34.95]). We have difficulty keeping phone numbers current (not to mention e-mail addresses and fax numbers; when changes of address occur, phone numbers are oftentimes not updated.)

c) E-mail list serve (29) or a web site (14) was frequently listed as a way to increase communication. Our World Wide Web address is discussed in Peter Budnick's article.

d) Miscellaneous comments:

- Keep it simple at current level
- Do not duplicate HFES efforts
- Fill the void of HFES
- Cosponsor meetings
- BCPE Conference
- Regular social events @ HFES annual meeting
- Let's not overtax our voluntary organization's staff

Many of the responders volunteered their services to various efforts of the BCPE. We thank you and will contact you further when needs arise. Those who volunteered newsletter articles will be the first to hear from us!

Venues to elevate the professional status of ergonomists included many suggestions. Most frequent among these were to promote, educate, publish articles or advertise the CPE/CHFP to the public, larger businesses, trade publications and government organizations (38); seek endorsement by organizations such as HFES, ASSE, BCSP, AIHA, ACGIH. Some other comments:

a) maintain status and distinction between CPE/CHFP and other certifications

- b) training seminars, workshops, CEUs, training courses (5)
- c) current activity commendable (3)
- d) categorize CPEs by specialty and geographical location
- e) some feel that this is not in our charter to elevate the ergonomist (is HFES' duty) others feel we should join forces with HFES to elevate ergonomists/human factors profession
- f) create an award for practitioner of the year (CPE/CHFP)
- g) integrate with certification efforts of other countries

Revenue source suggestions included:

- Exam and Certificant Renewal Fees (misnamed as dues by some) (28)
- Mailing Lists
- Educational Materials
- Publications
- Seminars, Short Course
- Sponsor or co-sponsor a conference
- Post job openings for a fee on WWW
- Start a publishing company (see our ad for Meister's book)
- Dinner meeting @ HFES (we'll have a "social" in Albuquerque)

Employment status of respondents often included more than one answer.

- 45% Corporation
- 7% Government Civilian
- 1% Government Military
- 36% Self Employed
- 23% Consulting Academic

Respondents provide ergonomic services to the following:

- 37% Dept. within my organization
- 68% Other business/industry organizations
- 5% Government/Legislative
- 6% Government/Regulatory
- 17% Government/Judicial
- 13% Government RD&E Lab

The top seven technical systems respondents are working on are consistent with those reported in other (e.g. NRC 1989) surveys. They are: Industrial - 54; Business - 27; Information - 24; Military-19; Mobility -19; Regulatory/legal systems - 13; and Consumer Products -10.

Of the 115 responders 99 were members of HFES or 86%. Some other organization membership figures were: 23-IIE, 13-IEEE, 3-ASME, 9-SAE, 16-APA, 24-ASSE, 10-AIHA, 7-ASTM, 1-AOTA, 5-HFAC/ACE, 8-ES, 3-ISOES, 2-IESS, 3-ACM/SIGCHI, 2-ACM/CHI and 1-IFMA.

HFAC/ACE CERTIFICATION IN CANADA

In a recent *Communiqué*, the publication of the Human Factors Association of Canada (HFAC/ACE), it was noted that the Executive Council is establishing a Canadian system of professional certification that will be able to respond to the particular needs of Canadian ergonomists as well as to the demands of any licensing body that may be established by a Canadian provincial government. HFAC/ACE members who seek certification will be encouraged to apply to the newly established organization when it becomes operational. In the meantime, the Executive Council of HFAC/ACE recognizes that the Board of Certification in Professional Ergonomics (BCPE), based in the United States, operates a valid system of professional certification. BCPE examines academic qualifications and requires evidence of professional competency from those who apply for certification. The Executive Council neither encourages or discourages members of HFAC/ACE to apply for professional certification by BCPE but

recognizes the right of each member to act as he or she chooses in this regard.

Recognition of the BCPE system will in no way limit the criteria adopted by the Canadian system of certification. Once the Canadian certification system is in place, the Executive Council will explore reciprocal recognition for the newly-established system with BCPE as well as with other bodies active in this field.

The Executive Council continues to commend full membership of HFAC/ACE as a valid criterion of expertise and competency in ergonomics and human factors.

The results of the recent HFAC/ACE postal ballot were presented by Chapter. The majority of HFAC/ACE members voted in favor of recognizing the BCPE system of professional certification on an interim basis. Of 210 ballots mailed, only 101 were returned. The greatest number of ballots in support for recognition of BCPE was from Ontario, and the least support was from the Québec Chapter.

CTD PREVENTION STANDARD

KEEP IT SIMPLE — AND SUCCESSFUL

by Dan MacLeod, CPE

Dan MacLeod, CPE, is Director of Ergonomics for Clayton Environmental Consultants and is a member of the American National Standards Institute (ANSI) Z-365 Committee on the Prevention of Cumulative Trauma. He represented the American Meat Institute (AMI) in working with the Occupational Safety and Health Administration (OSHA) in developing OSHA's *Ergonomics Guidelines for the Meatpacking Industry*. He has authored a wide variety of materials on ergonomics including a recent book *The Ergonomics Edge — Improving Safety, Quality and Productivity* (New York: Van Nostrand Reinhold, 1995).

Like many others, I have mixed feelings about the need for standards in ergonomics, or to be more exact, a Cumulative Trauma Disorder (CTD) Prevention Standard. On the one hand, I believe that ergonomics and CTD prevention is good for business, and therefore there's no need for regulation. On the other hand, it appears that a standard (or at least the right kind of standard) is indeed needed.

What Should a CTD Prevention Standard Look Like?

Based on my 25 years of experience as a practitioner and consultant to employers, trade associations and unions, I am totally convinced that a standard could be enormously effective if it simply and in only a few pages made the following statements:

- Work-related CTDs are real and can be linked with a number of risk factors (excessive exertion, awkward postures, etc).
- Ergonomics and medical management programs are effective in reducing these risks and lowering the incidence and severity of CTDs.
- Every employer with a CTD problem should institute a management process with several essential elements (training, employee involvement, systematic task analysis, etc).

Whether issued by ANSI, OSHA or anyone else, a standard of this sort does not need to be long and complicated. A simple authoritative statement in combination with the expectation of cost savings should be sufficient to

encourage employers to implement CTD-prevention programs.

Appendices can contain information that is valuable to employers, as long as these materials are clearly marked as educational (and thus not require activities that would be unnecessary or counter-productive in some workplaces).

OSHA has the special challenge of defining what would trigger the standard, as well as defining how to determine compliance. I suspect that these dilemmas could be resolved by targeting enforcement for the extreme violators, rather than the mass of industry.

Why Do We Need a Standard?

CTD prevention is good for business, since it can reduce costs and because ergonomic task analysis can provide insights on improving production and efficiency. In an ideal world, there would be no need for a standard, since market forces would lead employers to do the right thing.

However, there is a need for a standard for several reasons:

- Many organizations need the authority of a standard as a kickstart to implement a new activity like this. A particular case is the government employer, who is often unable to make any changes without a standard.
- The market fails because of "imperfect information," that is, employers don't know about the costs they are incurring and what is effective in improving operations.
- Market forces alone may take too long; worker safety is at stake, and permanent disabilities can be prevented in the meantime.

Rationale

This simple approach I advocate is basically that which successful practitioners have been using for years — a core set of program elements that must be addressed with every employer, followed by a multitude of program tools and management systems that can be used and/or modified depending upon the situation. More to the point, there's an increasing amount of evidence that these programs

work and CTDs can be prevented in a cost-beneficial way.

Furthermore, OSHA's Meatpacking Guidelines basically follow this framework. Even though the language used in those guidelines was then (and still is now) too complicated for my taste, all in all, the de facto requirements are simple ("have a committee," "set up training," "review jobs systematically," etc.) and are only a few pages long. Additionally, the appendices provided useful educational information to employers. And most importantly, these guidelines have been effective — the meat industry is virtually the only industry in which the CTD rates are dropping.

A Different Paradigm

Part of the problem in thinking about standards for ergonomics and CTD prevention is that the issues do not easily fit a compliance model. While it is clear that certain work factors like exertion and awkward postures can increase the risk for CTDs, the scientific data at this point are insufficient to establish any thresholds. Furthermore, determining whether or not any particular employer has an adequate management process for addressing problems is open to interpretation, to say the least. The issues are more akin to a standard for Total Quality Management, rather than a safety hazard.

On the positive side, addressing this dilemma can help us redefine the approach to regulation and litigation that has evolved in the U.S. in the past few decades and which has gone amuck. Since ergonomics is all about innovation and creativity anyway, why not use the issue of CTDs to see if we could develop a new paradigm?

Financial Benefits to Industry

Workers' compensation costs in the U.S. for all employers now total about \$100 billion annually, roughly half of which is related to CTDs of the lower back and upper limbs. Proper application of a standard could ultimately produce savings in the tens of billions of dollars.

Of special note are the benefits of a standard for small business. Currently,

BCPE IS ALIVE AND WELL IN THE ELECTRONIC WORLD!

CTD *(continued)*

a large self-insured employer can institute an ergonomics process and effectively cut costs. However, an individual small employer cannot do likewise. Even with the best of internal practices in one small company, insurance costs would not go down, since premiums are set by industry experience. Thus, it would take an industry-wide change in practices, and hence the importance of a standard.

CTDs as a Useful Construct

As a side note, some medical practitioners have difficulty with the concept of CTDs, since the term is a catch-all grouping many disorders, rather than a specific diagnosis. From a professional ergonomist's perspective, however, the notion of a CTD is a useful construct. In fact, in a certain way, it does not matter to us whether an employee complaint is diagnosable or not. Even minor discomfort and soreness can give us insights into a misfit between the task and the person.

A Standard Does Not Trivialize Ergonomics

Finally, a concern raised within the profession deserves a response. At least one or two CPEs have stated that they are worried that a standard would result in ergonomics being practiced by everyone, and thus somehow damage the profession. I have always believed there are two levels of ergonomics: (1) the sophisticated science "for professionals only", and (2) the basic principles which are usable by almost anyone. To use an analogy, we all need to know about the law and make decisions everyday based on that knowledge. But that does not make us lawyers.

I would certainly welcome widescale training and popularization of basic ergonomics. This would by no means "make everyone an ergonomist." On the contrary it would enhance the reputation of the field and open the doors for increased study of specific design questions that would benefit everyone.

Mr. MacLeod can be reached at Clayton Environmental Consultants, 160 Fieldcrest Av., Edison, NJ 08837 (908) 225-6040.

by Peter Budnick, CPE

Did you know that BCPE now has a World Wide Web Site and an email discussion list? The Web site is open to the world, and is directed toward those seeking information about BCPE and our certification program, as well as our certificants (including you!). Peter Budnick, President and CEO of ErgoWeb Inc., has graciously donated his time and electronic development skills to build and maintain the site and the email list. ErgoWeb Inc. is currently providing the hardware and Internet connections for the Web site, while the University of Utah Center for Design Systems provides the same for the email discussion list (both at no cost to BCPE).

The Web is changing the way people search for and gather information. Today, many begin and end their search solely on the Web, and every day more people are connecting. BCPE is pleased to be a part of this new and effective means to reach and inform the world of our programs. You can visit the Web site by pointing your browser to:

<http://www.bcpe.org>

Several certificants have already suggested ways to improve the BCPE site. In particular, there is an interest in expanding the list of certificants to include more than just names. For example, the list could be organized by location, so that a visitor could look for certificants by region. Further, the list could be expanded to include contact information, company or personal information, links to email and web sites, and more. BCPE is interested in pursuing the idea of expanding and increasing the value of the certificant list, however the extent of the project will depend entirely upon the level of interest among certificants, and yet to be determined fees would be required to recover project costs. Let us know whether we should pursue this direction.

The BCPE-PEN Listserv

The email discussion list, called "bcpe-pen," operates like many other "listserv" type forums. Members can

participate by submitting and responding to messages, or they may simply observe the postings and discussions of others. In the case of bcpe-pen, only BCPE certificants may join, and only list members may send messages to the list. All subscriber names and email addresses are kept private. To protect the list and it's members from "junk mail," we have established a moderation procedure. That is, each time someone attempts to join the list, the moderator (currently Peter Budnick) receives the subscription application, and after checking it against the list of certificants, either approves or disapproves the subscription. Similarly, each time a message is sent to bcpe-pen, it first goes to the moderator, who must approve or disapprove. Only approved messages will be forwarded to members.

We invite and strongly encourage anyone with an email address to join bcpe-pen. It is an inexpensive means to keep us all abreast of developments that affect our profession, or that demand our attention or response. bcpe-pen creates the opportunity for each of us to stay informed and share important information, and to become more involved in BCPE and our profession. To join, follow these instructions:

- 1) Send an email message to this address ("majordomo" is the name of the listserv software program):

majordomo@cds.utah.edu
- 2) Leave the Subject line of your message blank (it will be ignored by majordomo).
- 3) In the body of the message, type:
subscribe bcpe-pen <your-email-address> <your-full-name>

You do not need to type the "<" and ">" brackets. If you have any problems or questions, contact Peter Budnick at (801) 323-9444, or budnick@ergoweb.com, for assistance.

BCPE FINANCIAL PICTURE

Overview of 1996 Income and Expenses

The big financial news for BCPE is that the \$20,000 start-up loan provided by HFES has been paid off! On January 10, 1997 the final payment was made to HFES. This would not have been possible without the generous actions of several Board directors, past and present, and a few others who paid their certification maintenance fees in advance to the point of \$15,000 being raised between October 1996 and January 1997. We are deeply grateful to these individuals, and will not name them publicly as some wished to remain anonymous. We are also very grateful to HFES for the financial support this loan provided to make the process of voluntary certification in our profession a reality. We look forward to further cooperative ventures with HFES while maintaining our individual identities.

Income

CPE/CHFP Application Fees	\$10,765.00
Certificant Maintenance Fees	69,500.00
Directory Fees	519.00
Lapel Pin	50.00
Search Fees	36.00
Labels/Disk	395.00
Newsletter Subscriptions	236.00
AEP/AHFP Application Fees	3,270.00
Inform. on Policies, Practices & Procedures	25.00
Miscellaneous	215.00
Retake fee exam	240.00
Total Income	\$85,251.00

Expenses

Salaries	45,743.00
Payroll Taxes	4,330.00
Insurance	723.00
Rent	5,569.00
Telephone/Fax/e-mail	2,197.00
Hard/Software Maintenance	45.00
Capital Improvements	1,330.00
Equipment Rental	2,497.00
Office Supplies	622.00
Copying/Printing	2,674.00
Postage/Shipping	1,838.00
Exec Directors Travel/Reimb	146.00
Business Meetings	463.00
HFES Loan	11,000.00
Loan Interest	2,105.00
Bank Charges	1,065.00
Miscellaneous	1,325.00
Marketing	34.00
Directory	325.00
Newsletter	1,530.00
Total Expenses	\$85,561.00

FALL 1996 TEST RESULTS AND NEW CERTIFICANTS

Twenty-seven candidates sat for the September 1996 BCPE certification exam at Philadelphia Pennsylvania. Sixteen ergonomists successfully passed the BCPE's September certification examination to earn the CPE/CHFP credential. Six candidates were successful in earning the Associate Ergonomist Professional credential. Test scores were statistically consistent with those of previous candidates (Fall 1994, Spring 1995, October 1995, Spring 1996), and the overall "pass rate" for applicants now stands at 76.2 %.

Those successful in sitting for the Fall exam were:

Gail F. Alderdice MSE CPE
Chris Arteberry BS CPE
Jody L. Brenneman MS AEP
Adrienne L. Drohomirecky MSIE AEP
Robert R. Fox PhD CPE
Craig Halpern MSIE CHFP
Michelle Hutter BSE CPE
Philip A. Irish III PhD CPE
Steve K. Jahns PhD AEP
Rhonda A. Kinghorn MS CPE
Steve Krile BSHFE AEP
Nancy E. Laurie MS AEP
Jeffrey B. Nelson MS CPE
Paul J. Schwartz MS CPE
Michael R. Seay MS CPE
Mark A. Smith MS CPE
Brenda A. Torres MS CPE
Connie Vaughn MED CPE
Keith M. White PhD CPE
Douglas A. Wiegmann PhD CPE
Leslie N. Wilder MS CPE
David D. Wood MSIE AEP

Other applicants for the Associate title qualified for certification without taking part one of the exam based on their educational degree from an ergonomics/human factors degree program accredited by an IEA Federated Society [asterisks (*) denote awarded in 1997]. They are:

Khaled W. Al-Eisawi MS AEP*
Brian N. Craig MS AEP
Christian A. Johnson MS AEP*
Gerard C. Jorna PhD AHFP*
Sanjay T. Koli MS AEP*
Chi-Chang Lee MS AEP*
Marcio A. Marcal MSc AEP
Claudia F. Mazzoni MSc AEP
Kevin McSweeney MS AEP
Jacqueline Reynolds Mozrall PhD AEP*
Kurt F. Walecki MS AHFP*
Renee D. Ward MSIE AEP

Current totals of BCPE certificants are 694 CPE/CHFPs and 33 AEP/AHFPs. The above 1996 certificants have been added to the November 1996 edition of the BCPE *Directory of Certificants* which is now available (to certificants for \$19.95 and to non-certificants for \$34.95). There are geographical listings for both CPE/CHFP and AEP/AHFPs.

HUMANOMIC ERGOFATORS

(From the article "Human Factors in the Year 2000" by H. McIlvaine Parsons. Reprinted with permission from *Proceedings of the Human Factors Society 27th Annual Meeting*, pp. 79-83. Copyright 1983 by the Human Factors and Ergonomics Society. All rights reserved.)

When I asked the former HFS presidents what they thought our field would be called in the United States in the year 2000, 14 said "human factors" and one said "ergonomics"; 14 thought it would still be called "ergonomics" overseas, but one marked "human factors." My own prediction differs, based on some verses I composed many years ago which were given as a toast at the 1968 Ergonomics Research Society (UK) Annual Conference dinner:

I say, old chaps, have you heard
Of anything quite so absurd?

Though we're not detractors
Of quote HUMAN FACTORS,
ERGONOMICS is rightly the word.

ERGONOMICS? Say, what is this jazz?
It sounds like it's got no pizzazz.

It's all Greek to me,
While it's easy to see
HUMAN FACTORS is real razmatazz!

Instead of this verbal defiance,
We ought to support our alliance.

Without being comic,
Let's make HUMANOMIC
ERGOFATORS the name of our science!

I predict that such will not come to pass, even by the year 2000!...I forecast a total human factors/ergonomics professional population worldwide in the year 2000 between 20,000 and 25,000.

Editor's Note: "Fatigue" as a theoretical construct has been around for over 100 years and obviously affects more than flying skills. Anson Rabinbach in his book *The Human Motor-Energy, Fatigue, and the Origins of Modernity* (U of Calif Press 1992, pg 142) reports on the search for a "fatigue vaccine" in 1904: "The search for the laws of fatigue were accompanied by an equally intense search to discover its chemical properties. If the ergonomics approach might result in the optimal deployment of the body's energy economy, the chemical approach promised an even greater panacea: the discovery of a vaccine against fatigue."

It seems that a solution beyond natural rest breaks will be hard to come by in all areas of our working lives. As Malcom so aptly discusses, flying fatigued can be especially traumatic.

YOU MIGHT BE FATIGUED IF...

by Frederick V. Malmstrom, Ph.D., CPE

from *Flying Safety*, February 1997, pg 14-15 (Reprinted by permission.)

The National Transportation Safety Board (NTSB) doesn't consider fatigue a "cause" of aviation mishaps. Rather, as a "contributing factor." Personally, I think this kind of reasoning is more an exercise in semantics than reality. But, whatever the causes, the results of fatigue can be deadly.

So, what on earth is fatigue? It is, as psychologists are fond of saying, a theoretical construct. Nobody can measure it, weight it, time it, smell it, or place any physical units on it—yet everyone agrees it exists. It's been said that for every two Frenchmen who meet in a coffee house, a new political party is formed. It's also said that for every psychologist who writes an article on fatigue, a new definition of fatigue is created.

Fatigue is typified by symptoms of inattention, degraded judgment, poor motor skills, exhaustion, confusion, and a whole long list of other effects. (See table 1.)

I have experienced the near-fatal side effects of fatigue. This was an instance when we'd been up flying combat all night and coasted in sleepily for a dawn landing. The brakes somehow had collected water and froze. During the half-second of fatigue-induced inattention after touchdown, our EB-66C's brakes locked up, and we spun into the infield grass. Happily, all six of us walked (well, ran) away from that one.

The Four Causes of Fatigue

As researchers Richard Adams of Advanced Aviation Concepts and Dr. Alan Stokes of the Florida Institute of Technology (1995) warn, fatigue is much more than just sleep deprivation. There are at least four known causes:

1. Inadequate rest.
 2. Desynchronized physiological circadian rhythms.
 3. Weariness following physical activity.
 4. Impaired judgment following prolonged mental activity.
- And any or all of the above-mentioned causes are enough to induce fatigue.

Fatigue-Induced Errors

Even though the NTSB says fatigue doesn't "cause" mishaps, research shows it sure causes errors. As students of the theory of signal detection know, there are only two categories of flying errors: (1) *errors of commission*, and (2) *errors of omission*. Unfortunately, fatigue causes both categories of error, although the error of *omission* is by far the most common.

Adams and Stokes cited a classic 1948 U.K. study in which fatigued subjects flying a simulator made numerous errors of omission followed by several "catch-up" errors of commission. Talk about making a bad situation badder!

What are the most common fatigue-induced flight errors? Well, for instance, in

1995, Dr. J. C. Wilson of Leicester University and Capt A. Elsey and Mr. P. Hunton of British Airline Pilots' Association (BAPA) surveyed over 1,000 U.K. commercial pilots and flight engineers. Although no single type of fatigue-related error is overwhelming the "miscommunication"* error seems to come up more frequently. Their study found a shotgun spread of fatigue-related errors—probably because fatigue is a *global* thing. When you fly long hours, you fatigue your entire person—not just your eyes, not just your mind, and not even just your backside. The nasty thing about fatigue is that it seems to lower your all-around ability to *integrate* the parts of the puzzle.

Fatigued individuals have limited attention—they see the trees but not the forest. For instance, older (like me) people are especially vulnerable to fatigue. That's probably in no small part due to our reduced brain, skeletal, and muscle mass. There is simply physically less of us to cope with the global problems of the world.

How Do You Recognize Fatigue?

Unfortunately, fatigue, like hypoxia, tends to sneak up on the victim gradually and isn't always easy to recognize. Having worked with mental patients for years, I've noted that the truly psychotic persons are themselves the last to know that they're crazy. Hence, they must rely on outside observers to point this out to them, and even then, these disturbed persons often won't accept the fact. Likewise, fatigued persons tend to be in denial and wouldn't always recognize fatigue if it bit them.

Dr. Richard F. Haines and C. Flatau, in their book *Night Flying* (1992), have taken the time to table some observable effects of fatigue. I've condensed some of their findings into Table 1. Note that some of the effects can be seen only by you (intrinsic symptoms). Extrinsic symptoms are easily seen only by others. Please take the time to note the extrinsic symptoms. They're the kind of behaviors which the individual typically ignores but the outsider should be able to spot rather easily.

If you aren't able to recognize your own fatigue symptoms, the least you can do is recognize these fatigue symptoms in others. And, if you do, you can say, "You might be fatigued if...you have these symptoms." I'd have been grateful if someone had brought that to my attention on that morning 30 years ago while I was landing in the EB-66C.

*Miscommunication is a hot topic in aviation research. CRM-crew resource management (aka cockpit resource management)—analyzes things like crew workload, social interactions, and (mis)communications. For further reading, see Maj. Eric Offil's article, "Cockpit Resource Management," in the September 1996 *Flying Safety*.

Table 1. You might be fatigued if...you have these observable effects of fatigue (from Haines & Flatau, 1992)

What you see:

INTRINSIC SYMPTOMS

A. PHYSICAL

1. Frequent, unexplainable headaches
2. Muscular aches and pains
3. Breathing difficulties
4. Blurred/double vision
5. Burning urination

B. MENTAL

1. Attentional focusing
2. Easily distracted
3. Reduced flying standards
4. Feeling of depression
5. Impaired judgment
6. Poor visual perception

What others see:

EXTRINSIC SYMPTOMS

A. PHYSICAL

1. Degraded motor skills
2. Tenseness and tremors
3. Intolerant/irritable
4. Increased reaction time
5. Social withdrawal

B. MENTAL

1. Absentmindedness
2. Poor short-term memory
3. Lack of interest and drive
4. Confused and fearful
5. Slow startle response
6. Worried and anxious

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April 4, 1998
Applications due February 4, 1998
Given at various locations in the
USA and Canada

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October 4, 1998
Applications due August 4, 1998
Chicago, IL

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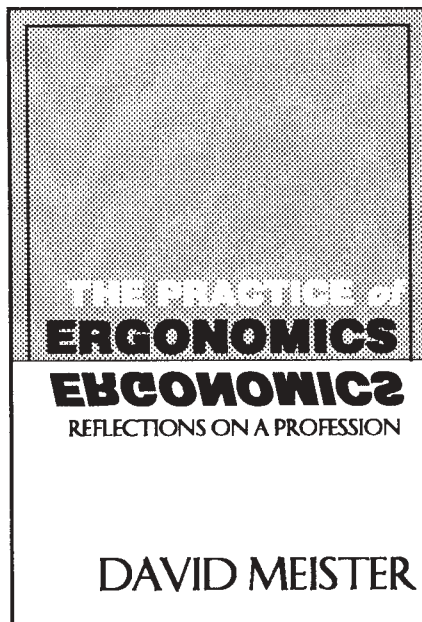
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