The Newsletter of the Society of Actuaries
VOL. 22, NO. 10
NOVEMBER 1988

THE Actuary

Violation of examination rules

by Robert J. McKay

The Society of Actuaries has always maintained very high standards in the administration of actuarial exams. Unfortunately, we have noticed an increase in cheating incidents over the past couple of years.

Most incidents do not appear to be premeditated. However, we occasionally come across a very serious situation in which the candidate has deliberately planned to cheat. Recently a candidate paid another individual to write an exam for him. The candidate was barred from taking actuarial exams for life.

A serious and more common problem involves candidates who copy answers from other candidates during the exam. While still few in number, these incidents recently have increased. The Examination Committee usually finds out about alleged violations from the exam supervisor's report. Upon receipt of such a report, we make a thorough investigation. If we conclude the candidate copied one or more answers from another candidate's material, the cheating candidate's paper will be disqualified. In addition, the candidate will be prohibited from writing an actuarial exam for some period of time. In recent years, suspensions have been for at least two years.

Any candidate who cheats on an exam is sent a letter from the Chairman of the Examination Committee detailing the allegations and outlining any disciplinary action being taken. In such cases, the individual has a 30-day period to appeal the penalty by asking for a hearing before three Fellows.

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The college credit controversy

(Ed. note: In October 1987, the Society's Board of Governors decided not to proceed with a proposal to accept college credit in lieu of Society exams for Level 1 [Parts 1 and 2] but to proceed on an experimental basis with a much more limited proposal for Level 2 subjects [Part 3] starting with the 1990-91 academic year.

The Board recently received the letter printed below, signed by 346 members [222 Fellows and 124 Associates]. Space limitations prevent us from listing all the signatories, but the covering letter to the Board was signed by Mark David J. Evans, FSA. The Board's response to this letter is given in a letter from Vice President Michael McGuinness.)

Letter of opposition

To the Board of Governors:
The Board of Governors' recent decision to grant examination credit on the basis of college courses is opposed by a significant proportion of the membership and contravenes the spirit, if not the letter, of the Society of Actuaries' constitution. We have grave concerns regarding the decision of the governing bodies of the Society of Actuaries to implement the Acceptance of Equivalent Credit for College Courses (AECCC) on an experimental basis. Under this experiment, some people would receive examination credit for Level 2 subjects by completing college courses, subject to various requirements.

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McGuinness's letter

Dear Member:
Thank you for writing to the SOA Board of Governors to express your concern about its decision to implement Credit for College Courses (CCC) on an experimental basis. I am replying to your letter in my role as the Vice President responsible for all education matters.

Before I address the two specific points that you raise, I would like to clarify the difference between Level 1 and Level 2 CCC (as described in the FEM white paper) and to describe the process the Board went through to reach its decision.

Convinced that an experiment was necessary to substitute facts for

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In this issue:

THE Actuary

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Opposition cont'd

If a majority of the membership approved of AECCC, we would address our concerns in a different fashion. However, according to the FEM White Paper survey, the majority of the respondents (representing about 18% of the membership) responded negatively to questions concerning AECCC. The most direct question concerning this topic and the distribution of responses follow:

What effect would each of the following specific suggestions have on the education of actuaries?

	Level 1 College Courses	Level 2 College Courses
Significant Improvement	6.0%	6.8%
Some Improvement	34.7%	38.2%
Somewhat Negative	38.1%	34.6%
Detrimental	21.2%	20.4%

Level 1 college courses apply to the old Parts 1 and 2. Level 2 courses are those where certain aspects may not easily lend themselves to multiple-choice examination, such as those instances where a computer is frequently used to solve problems. These courses include Operations Research, Applied Statistical Methods, and Numerical Methods.

Quite telling about the survey response is that about 20% of the respondents were strongly negative while only 6%–7% were strongly positive. What was the purpose of the survey if you plan to proceed with AECCC despite the negative reaction received? Furthermore, two former presidents of the Society, Richard S. Robertson, FSA, and Harold G. Ingraham, FSA, have said or written publicly in an official capacity that such changes should not be made without the strong support of the membership.

There is also a constitutional concern with AECCC. You appear to be acting in violation of the intent and spirit obtained from a plain reading of Article III, Section 2, subsection c of the Society of Actuaries' constitution regarding the waiver of examinations. If the Board chooses to continue in this direction, we suggest that the Board propose an amendment to the constitution that would clearly allow AECCC. If the amendment effort is successful, then the Board can proceed, knowing they are not violating the wishes of the majority or the constitution.

In conclusion, we protest the Board's actions for the two reasons. First and foremost, you are not acting democratically by proceeding with this experiment against the apparent wishes of the majority of the membership. Second, it is not clear that you are adhering to the Society of Actuaries' constitution. We feel a high degree of frustration, not only because we disagree with AECCC, but also because we have significant concerns about the propriety of the Board's handling of this matter. Accordingly, we the undersigned members of the Society of Actuaries respectfully petition the Board of Governors to rescind the Board action that authorized the waiver of Society examinations on the basis of college courses until such waivers have been authorized by the membership.

Sincerely,

(Signed by 346 SOA members)

McGuinness cont'd

impressions, the Board voted unanimously to authorize an experimental program of Level 2 CCC. The topic was clearly of concern to some of the membership. The Board was also convinced that CCC (if the experiment is successful) will lead to better-educated actuaries and thus enhance the value of the FSA designation.

The Education and Examination Committee originally proposed two levels of CCC. Level 1 CCC was proposed as an alternative to Courses 100 and 110 (the old Parts 1 and 2). This would have replaced the current procedure, which accepts a sufficiently high score on the Mathematics Graduate Record Exam in place of Course 100. Level 1 CCC was designed to shorten travel time for high-caliber students who had not taken any SOA exams. It would allow them to receive credit for Courses 100 and 110 if they had taken courses covering these subjects in most North American colleges and universities and could demonstrate proficiency in passing exams by their progress through the later Associateship exams. Level 1 CCC was designed to reduce some students' travel time to ASA rather than for its educational value. In response to concerns expressed both at the Board and membership levels, the E&E and Education Policy committees voted to defer consideration of CCC Level 1. Before submitting FEM to the final

Continued on page 3 column 1

McGuinness cont'd

Board discussion, the committees proposed implementing Level 2 CCC on a trial basis only.

Level 2 CCC (as proposed by E&E and approved on a trial basis by the Board), on the other hand, will be available only from North American colleges and universities that have had specific courses precertified by the SOA. To be precertified, a course must cover the appropriate material and give students a better education than possible through our traditional self-study methods. If the experiment is successful, we anticipate that students who take this route will be better able to effectively use mathematical tools such as applied statistics, operations research, etc.

Level 2 CCC is carefully designed to prevent abuse. All the following conditions must be satisfied for an actuarial student to receive Level 2 CCC:

- The college or university must be approved by the SOA.
- The course content, teaching methods, and instructors must be approved by the SOA. Two administrations of the same course must have occurred before it will be approved.
- Expected and actual grade distribution must be furnished to the SOA, and credit may be withheld if unexplained "grade inflation" occurs.
- The student must obtain a B grade; it is quite possible the SOA may require a higher grade if the expected grade distribution warrants it.

In addition, the Board expects an initial and detailed evaluation of the trial Level 2 CCC program after two or three years. It cannot be extended indefinitely by the E&E Committee.

The Board initially considered the FEM proposals in May and October 1986, and they were discussed at every 1987 Board meeting. The Board approved the release of the FEM White Paper in January 1987 to solicit membership response. Between Board meetings, the proposals were discussed at length by the Education Policy Committee and the E&E Committee and were refined as those committees received Board and membership input.

The final Board discussion in October 1987 recognized that members' opinions about CCC varied widely. However, the Board approved unanimously implementing Level 2 CCC on a trial basis because it was convinced that further discussion would not shed more light on this subject and that everyone who wanted to be heard had been heard. The Board will closely monitor the experiment. If the experiment is not a success, the Board will withdraw its approval of future CCC.

Your letter raises two specific points. You state that college credit violates the intent and spirit of Article III, Section 2, subsection c, of the SOA Constitution. This subsection was intended to be, and is, applicable only to the waiver of SOA examinations for a candidate who has passed examinations required by another recognized actuarial organization. Clearly this subsection is not applicable to the current situation.

Article III, Section 2, subsection a, states that an applicant for Associateship must "...pass the examinations prescribed by the Board of Governors...and...comply with any further requirements the Board of Governors may prescribe." The Board has acted in accordance with this subsection of the Constitution and approved ASA FES at its May 1986 meeting. Under ASA FES a candidate may obtain credit for certain ASA courses either by meeting the requirements prescribed by the Board for Level 2 CCC or by SOA examination.

You also state that the SOA has acted undemocratically because it did not put college credit to a vote of the membership. The Board of Governors is democratically elected to conduct the business of the SOA. (The Constitution refers to the management of the SOA being vested in the Board in Article IV.) Many issues that come before the Board require careful thought and discussion, followed by action. If the Board put every controversial issue to a membership vote, it would not be carrying out the function and the leadership required of it.

I would like to reiterate that the Board acted democratically and within its prerogative in approving the experiment for Level 2 CCC. It did this only after careful consideration. It believes that the experiment will be successful and will improve the quality of future actuarial education. However, if the experiment is not successful, the Board will withdraw its approval of future college credit.

Once again, thank you for your letter.

Sincerely,

Michael B. McGuinness
Vice President, Society of Actuaries

Violation cont'd

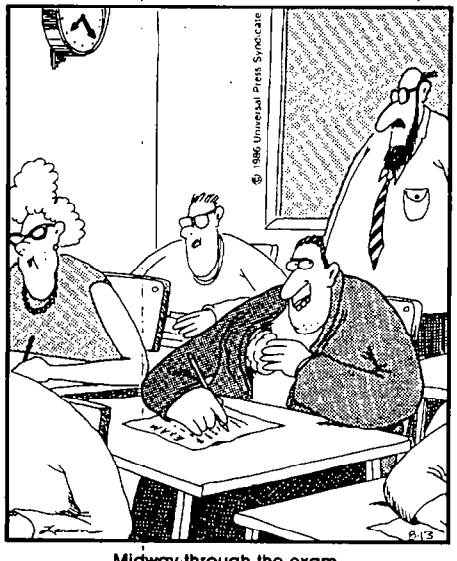
Another problem involves candidates who continue to answer items after time has been called. Typically this occurs on multiple-choice exams. If we receive a notification from the exam supervisor that this has occurred, generally the paper is disqualified. The candidate is given a score of zero and warned that a repeat incident will involve further disciplinary action. During a recent exam, a candidate had two papers disqualified for failing to stop writing. This individual was repeatedly warned by the exam supervisor to stop and refused to do so.

Since the introduction of calculators on actuarial exams, we have encountered a few students who insisted on using their own calculators, instead of the Society of Actuaries' model, even after the supervisor informed them that the calculator was not allowed. Papers from students who use other than the Society's basic four-function calculator are automatically disqualified.

The E&E Committee wants to ensure that everybody writing the actuarial exams is subject to the same rules. We will continue to vigorously investigate alleged violations of rules so that nobody receives an unfair advantage.

Robert J. McKay, Chairperson of the SOA Examination Committee, is a Partner, Hewitt Associates.

THE FAR SIDE By GARY LARSON



Midway through the exam, Allen pulls out a bigger brain.

Centennial year calls for celebration, contemplation

by Ian M. Rolland

It is a distinct honor and unique opportunity for me to assume the presidency of the Society of Actuaries in the 100th anniversary year of the profession in North America. A centennial year presents a special occasion for a celebration of accomplishments as well as a careful examination of future challenges. In this article, I would like to start this process, which will reach its climax at our centennial meeting in Washington June 12 – 14, 1989.

Looking back, I feel a great deal of pride in the development of the actuarial profession. Over the years, I believe our principal accomplishment has been a strong education system based on rigorous qualification standards. That has produced professionals trusted by users of actuarial service to perform with competence and integrity. The great majority of our members are pursuing rewarding careers and, as illustrated by recent surveys, they view their personal situations with much satisfaction.

This education system, as well as many other professional activities, is driven primarily through the dedication of hundreds of volunteer members. I suspect such a volunteer endeavor is unique among professional groups, and we can take pride in the effort. This commitment by actuaries to put something back into the profession is a collective strength that has contributed much to our past successes and must be nurtured in the future.

Our meetings and seminars – which have become such an important part of our continuing education – could not be conducted without the unselfish participation of hundreds of our members. Dedicated actuaries also staff the many task forces and committees that explore issues of critical importance to our profession and the publics we serve.

These and other strengths bring our profession to its 100th anniversary with a history of excellence. We are justified in celebrating our heritage.

This anniversary, however, must be a time for preparing ourselves and the profession for the future. Many activities this year will be devoted to that end.

One of the most important issues facing each actuarial organization in 1989 will be the report of the Task Force on Strengthening the Profession. We owe a significant debt of gratitude to Allan Affleck and his task force members, who have produced a report that deserves our careful consideration and, ultimately, adoption by each actuarial organization. The report's recommendations will better rationalize the structure of our profession and enable us to meet our increasing responsibilities in the area of public interface.

The roles of the existing actuarial organizations can make some sense when they are viewed narrowly from the standpoint of each organization. The current structure creates inefficiencies and overlap among the various bodies, though, and it clearly causes major problems as we interact with our publics. These publics view us as a single profession rather than as separate specialties. As long as we remain fragmented, we will have serious problems with our external communications.

Our profession is little known. We have not achieved official recognition as have other professions, and we do not participate sufficiently in the debate on issues of legitimate interest to actuaries. These issues will be increasingly burdensome for us if we do not act soon. I expect the task force report will be accepted by the boards of each actuarial organization in the near future for distribution to the membership. I encourage all Society members to participate in the discussion.

Another important activity befitting our centennial year will be the consideration and implementation of the report from the Task Force on The Actuary of the Future/The Future of the Actuary. This report was considered by the Society Board at the October meeting, and its recommendations should have far-reaching implications. This activity was begun by Gary Corbett early in his presidency, and we are fortunate that he challenged our level of comfort with this study of our future.

The task force tells us the actuary of the future will need a broader perspective than in the past. There will be an increasing need for a high level of expertise in management and communication. This in no way diminishes the technical skills that have been our strength in the past; instead it recognizes that those technical skills can be enhanced through improved communications skills. The report also points out areas where our skills can be applied to new endeavors, thus offering new opportunities to existing and future actuaries. In any case, this report will likely bring about changes in our systems of recruitment; basic and continuing education; and examinations and research.

In 1988, Vice President Irwin Vanderhoof assumed responsibilities for Society research. Under his leadership, the Board made a tangible commitment of money and staff to the revitalization of research. As a result, the Research Policy Committee has been gathering a list of potential projects and has established a process for prioritizing them. This important activity will continue with vigor in 1989 so research can assume its rightful priority. Advancing knowledge through research is a fundamental responsibility of every profession. The record of the Society in this area has been mixed. We are now well on the way to changing that.

As if these three forward-looking agenda items for 1989 were not enough, many other issues will be considered by Society members and their leadership. One issue recently identified by the Planning Committee is the relationship of the profession with U.S. universities; a sub-issue involves the state of actuarial education at U.S. universities. It is increasingly clear that this has been a neglected area. Exemplary university education programs are a point of strength for the profession in Canada. Such is not the case in the United States, even though some excellent programs exist here. We will examine the way the Society can support, encourage and relate to actuarial education programs in U.S. universities.

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Centennial cont'd

Finally, a challenge that seems especially appropriate to address in our centennial year is to make sure all our members – no matter what their field of activity or country of residence – feel represented in the leadership of the Society and that the Society is responsive to their needs. Our meetings and seminars have increasingly recognized the needs of pension and health actuaries. That has been a positive trend and must be continued. Now we need to find ways to make sure that non-company and non-life insurance actuaries have full and complete involvement on the Society Board and Executive Committee. The result will be better decisions and programs even more responsive to the needs of all members.

The year 1989 will be exciting for all actuaries. We will properly and enthusiastically honor our heritage while working on a diversity of issues that should make our future even brighter.

Ian M. Rolland, SOA President for 1988-89, is President, Lincoln National Corporation.

New retirement history survey proposed for U.S.

Comments are welcome on a National Institute on Aging proposal for a periodic survey to obtain needed data on retirement, health, and economics among retirement-age persons (ranging from as young as 50 or 55 on up). This U.S.-government survey would revive and expand the Retirement History Survey, which was conducted every two years from 1969 to 1979. The planning is directed by Dr. Richard Suzman, Behavioral Science Research Office, National Institute on Aging, Building 31, Room 5C32, Bethesda, MD 20205.

At the September 9 meeting of the Council of Professional Associations on Federal Statistics (COPAFS), Dr. Suzman said that comments on the proposed survey would be considered if received by him within a few months. Some background information on the subject, received through COPAFS, may be obtained from Daniel F. Case at his *Yearbook* address or phone number.

Expert explains expert systems

Features Editor Deborah Poppel spoke with Stephen F. Siegel, Director of Knowledge Engineering at Applied Intelligence Systems, Inc. (AIS). AIS is a New York City-based vendor of expert systems, predominantly in Life Insurance Underwriting. Dr. Siegel has a Ph.D. in Experimental Psychology from Brown University.

***Poppel:** What is an expert system?*
Siegel: An expert system is a computer program that processes information at a level equal to or near that of human experts. It consists of a set of rules, also called the knowledge base, and a computer program to process the rules, also called an inference engine.

***Poppel:** Are the terms "Expert Systems" and "Artificial Intelligence" (AI) interchangeable?*
Siegel: No; expert systems are a susbset of AI, which is the study of how computers can simulate functions of the human mind. Other subsets are robotics, machine vision, machine learning, and natural language understanding. The piece of AI that's the most viable in business right now is expert system technology.

***Poppel:** Who builds expert systems?*
Siegel: A knowledge engineer builds them. This differs from a programmer, who generally works from a well-defined set of specifications. For a knowledge engineer, the biggest challenge may actually be determining the specifications.

***Poppel:** How does someone become a knowledge engineer?*
Siegel: You can't go to school for it, at least not yet. Knowledge engineers are often former programmers. However, as expert systems become more sophisticated, it's becoming more important for knowledge engineers to have an understanding of human cognition – how people think.

***Poppel:** How is an expert system different from a conventional system?*
Siegel: Some people don't think they're different. For me, as a psychologist, the difference is that an expert system is trying to emulate a human problem-solving process. Some people's definition is that it's written in a particular AI language.

One key difference is that the expert system's rules live separately from the rest of the system. An advantage of designing a system this way is that instead of having a long period of defining specifications, you can build the system and change it later, more quickly and efficiently than you can change a conventional system.

***Poppel:** Can you give an example?*
Siegel: Let's say you have a system for underwriting life insurance. It may have a rule that says, "If the proposed insured participates in a dangerous avocation, refer the case to an underwriter." That's a very simple, yes-no rule, which might be sufficient for a first-cut system. If you want to make the system smarter, you can build more choices into the yes answers – "If the avocation is skydiving, how many hours?" You can keep adding possible outcomes, or nodes, to the decision tree.

***Poppel:** Other differences?*
Siegel: Another difference is that our systems are built primarily by the experts, rather than the knowledge engineers and programmers alone. Since the rules don't have to be explained to systems analysts, who in turn explain them to programmers, who then translate them into computer code, you avoid losing something in the translation, and the end product is more likely to do what you want it to.

Normally, you build computer systems to do things involving a lot of computation that people aren't very good at. These systems are algorithmic – they use an explicit set of instructions for calculating solutions. Expert systems are heuristic – they use rules of thumb, which means they will be right most of the time, but not necessarily all the time, sort of like human experts. You might say that in conventional systems, the computer is told how to solve the problem. In expert systems, the computer is told what the problem is, but not how to solve it.

***Poppel:** What's the hardest part of developing an expert system?*
Siegel: The hardest part is coming up with the rules. In many cases they're

Continued on page 6 column 1

Expert explains cont'd

not written down anywhere, but are handed down through some master-apprentice relationship, which means you need to elicit the knowledge directly from the experts. The trouble is that experts usually can't correctly articulate the rules they use to solve problems.

Another problem is that human experts do not typically reason using the "if...then" rules that are used by many expert systems. At the same time, one of the typical methods of human problem solving, reasoning by analogy, is currently unavailable in expert systems.

Poppel: *How else can you come up with rules, if you don't ask the experts?*
Siegel: One way is by induction. This method uses specific cases to induce a general rule. If you're building a system for loan approval, you might plug in a bunch of loan applications and whether or not they defaulted, and try to induce what would have been good criteria for loan approval.

One problem with induction is that even though it seems objective, someone is still making the judgment as to what the important items are to plug in. Another problem with induction is that if you took, for example, all the underwriting decisions made in your company over the past year and tried to induce whatever rules were used to arrive at them, you'd get by definition an expert system that was as good as your average underwriter.

Poppel: *So how do you make rules?*
Siegel: We make the rules by having the experts write them within our software shell, which we call Decision Master. The shell is designed to be simple enough for a nonprogrammer to operate. In addition, someone like me helps them try to figure out the rules from their own knowledge sources, such as manuals. Then, through an iterative process of testing and revising, the rules are fine-tuned until they work the way we want them to.

Poppel: *Is it fun being involved with something new?*
Siegel: One of the reasons I got out of mainstream psychology is that I thought all the good stuff had been discovered already. That's probably not true, but there is something to getting in at the very beginning when there's less background to know and a lot to discover, such as the best ways to elicit knowledge from experts.

Poppel: *How can someone decide if a particular business application is suitable for an expert system?*
Siegel: Expert systems make the most sense in areas with only a few experts. If everyone is an expert, it probably doesn't pay to have an expert system. If there are no experts, you can't really have an expert system.

Poppel: *Actually, it seems that an expert system would be very useful in an area where there are no human experts.*
Siegel: True, building one would be an interesting challenge. You might try to induce the rules, or you might take bits and pieces from a lot of people who each can solve part of a problem.

The prime application is one where there are only a few experts, they make a lot of money, and you're afraid of losing them. Any job where people are referring frequently to manuals, looking up what they're supposed to be doing, is a likely target.

Poppel: *Are expert systems cheaper than people?*
Siegel: In many cases, an expert system would be cheaper and more efficient than people, although not every department would be able to cost-justify a system. Human experts have bad days and take time off; expert systems can work almost constantly. Besides, if a key expert leaves, replacing that person may be expensive or impossible. Expert systems can help alleviate this problem.

Expert systems also can produce a higher quality, more consistent product. Sometimes there are so many underwriting rules, and exceptions and changes to the rules, that the underwriters can't keep up with them. Different underwriters obey different subsets of the rules and interpret them differently.

Poppel: *What criteria should someone look for when choosing an expert system vendor?*
Siegel: One thing to look for is flexibility. You'd like to be able to generate your rules in the way that makes the most sense for a particular application, be it induction or writing the rules by hand. It's also nice if the system can run on many different machines. You'd also like the shell to be written in such a way that it's easy to follow what it's doing – this makes it easier to work with.

Poppel: *If you found yourself at a party with a bunch of actuaries, what would you want to tell them about expert systems?*
Siegel: One reason actuaries should be interested in expert systems is that the rules developed by actuaries will be followed with more consistency. It will also be possible to have more complex rules. Right now, the actuary is forced to develop rules and procedures that can be followed by human beings. For example, the rule may be, if the proposed insured is older than 40 and the amount of insurance exceeds $100,000, order a paramedical exam. The "right" rule would probably factor in the PI's family history, the cost of an exam, and the agent's track record. An expert system could handle a rule like this, while a person underwriting 50 cases a day would find it unwieldy.

Expert systems also produce a lot of data for actuaries to work with, allowing them to test many "what-if?" scenarios.

Finally, I'd say, "Those tests aren't really that hard, are they?"

91% say they're pleased with *The Actuary*

Readers are pleased with the redesigned *Actuary*, according to responses received on a membership questionnaire mailed out with the June newsletter.

Of the 308 respondents, 91% checked yes to the question, "Are you satisfied with the content and types of articles?" Asked, "Do you find *The Actuary* easy to read," 93% answered yes. *The Actuary* was redesigned with the September 1987 issue in hope of making it a more effective communications vehicle.

Many readers had suggestions for further improvement, including shorter articles and more humor. Others want to see more articles on pension issues, FES/FEM, and Society activities. Many had suggestions for specific articles, which are being considered by *Actuary* Editor Linda B. Emory for future issues.

Editorial

The "blacksmith mentality"

by M. David R. Brown

A surprising number of actuaries seem to assume the world owes us a living collectively as a profession. The latest evidence of this dangerous attitude, which might be termed the "blacksmith mentality," is the letter printed in this issue, signed by 346 Society members. The letter belatedly protests the action of the 1986-87 Board of Governors in agreeing to a severely limited and closely monitored experiment. This experiment would grant credit toward Society membership for achieving a certain standard in accredited college courses in such preliminary subjects as Operations Research, Applied Statistical Methods, and Numerical Methods.

The letter does not address the merits or faults of the proposal but attacks the Board for ignoring the membership's views as expressed in a survey about various education proposals. The letter also asserts a possible constitutional impropriety in the Board's failure to put the matter, in one way or another, to a membership vote.

These allegations are fully dealt with in Michael McGuinness's reply, also in this issue. What is disturbing is the unspoken assumption that it is somehow undemocratic for the Board to entertain even the smallest willingness to consider the college credit question without first obtaining an explicit mandate from the membership. Clearly, what we have here are 346 would-be blacksmiths. Their views are a reflex reaction to the careful examination of a small progressive change in our system. Senior members of the profession and many employers of actuaries have repeatedly expressed concern about the narrowness of our professional training and our reluctance to give up the old ways, both in the subject matter of our syllabus and our educational methods, or lack thereof.

Are we attracting our fair share of the best and the brightest? Or are we driving them away unnecessarily at the front end of our qualification process? Is it possible that strong

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FACTUARIES

by Deborah Poppel

This is the first in a series of profiles of members of the Society's Board of Governors. Special thanks to Steve Radcliffe, our first subject, for suggesting the name "Factuaries."

Name: *Steve Radcliffe*

Birthday: *July 6, 1945*

Birthplace: *Star City, Indiana*

Current hometown: *Indianapolis*

Current employer: *American United Life*

Children's names and ages: *Weston, 14; Hamilton, 11*

My first job was: *as an actuarial student at New York Life. Some of my most memorable moments were working with Charlie Sternhill, Walt Miller, and John Frazier on the first Variable Life paper.*

I'd give anything to have met: *Albert Einstein*

The number of exams I flunked: *0*

The books I recommend most often: Bonfire of the Vanities, Third Wave

The last movie I saw: Midnight Run

Nobody would believe it if they saw me: *shopping*

The TV show I stay home to watch: *None*

If I could change one thing about myself, I'd: *find more time to chill out and relax.*

When I'm feeling sorry for myself: *I am not a pretty sight.*

My fantasy is: *a round trip flight to the moon, or winning an international barbershop quartet competition.*

The silliest thing I've ever done: *At a reinsurance conference at Vail, after a long and late night, I got up early to ski. Unfortunately, in my fuzzy state I put my ski boots on the wrong feet and complained about how they hurt. Some of my ex-friends promised not to tell anyone.*

If I could do it over I'd have: *started playing golf and tennis earlier in my career.*

My proudest actuarial moment was: *being elected Vice President of the Society of Actuaries.*

The best time of my life was: *living in New York City in the 1970s.*

Blacksmith cont'd

university programs could help us bring in candidates we need but may not otherwise attract? Why do all the major professions rely on the universities and colleges for the preprofessional part of the education process? Why have our professional brethren in the United Kingdom and Australia already gone so far down the path that we are only timidly proposing to test in a limited way?

The only valid criticism of the Board's action is that it may be too little and too late.

Major SOA symposium addresses Future of Retirement

Experts from a variety of disciplines will look ahead to the baby boom retirement years of 2000 and beyond at the Future of Retirement Symposium November 29-30 in Chicago.

Speakers will address the major changes expected to hit the pension, life, and health fields at the turn of the century. In the year 2000, forecasters say, Americans will rush to retire before the expected ages of 60-65, and there will be more than one retiree for each two active employees.

Anna M. Rappaport is Chairperson of the Symposium, which is sponsored by the Society of Actuaries in cooperation with the American Academy of Actuaries, the Conference of Actuaries in Public Practice, the Employee Benefits Research Institute, and the Pension Research Council.

The symposium will help participants gain the broad perspective necessary to work with employers and clients on retirement-related issues and to enter the forthcoming public policy debates. The symposium will examine trends for public policy; financial security products and systems; and employment and the workplace. Speakers will be actuaries, economists, social scientists and consumer group representatives.

The conference format will include multidisciplinary panels and workshops, so that all participants will have a chance to discuss these issues. A multidisciplinary audience is expected.

Contact the Society office for more information and registration forms for the symposium.

NCHS: More than mortality, life expectancy statistics

by Manning Feinleib, M.D.

The National Center for Health Statistics (NCHS) serves as the focal point for U.S. health statistics. Many actuaries are aware of NCHS statistical reports on mortality and life expectancy and its many publications that present current, trend, and analytical studies of life expectancy. Recognized the world over as an indicator of health progress, NCHS life tables are used to plan pension and benefit programs and to conduct economic and demographic research.

The NCHS data collection program, however, goes beyond these important vital statistics. The Center produces data on the extent of illness and disability in the population, on the supply and use of health services, and on health behavior, attitudes, and knowledge.

From its start in 1960, NCHS has fielded an array of data collection programs – each collecting specific information to complete the nation's health profile. NCHS health statistics are used to set national health policy, to plan and administer health programs, and to conduct epidemiological and biomedical research. NCHS data form the basis of health education, disease prevention, and health promotion efforts.

Fortunately, in this era of limited resources, most NCHS data collection efforts are continuing as scheduled. For example, NCHS fielded the third National Health and Examination Survey (NHANES III) last month. During the next six years, the survey will reach 40,000 persons in 88 locations across the country, making it the most extensive national health examination survey.

NHANES III will use direct physical examination, clinical and laboratory tests, and related measurement procedures to collect data on the prevalence of chronic conditions, including heart disease, diabetes, hypertension, and gallbladder disease. The survey will emphasize four areas: child health, health of older Americans, occupational health, and environmental health. Blacks and Hispanics will be oversampled to produce reliable statistics for these groups.

NHANES III also will provide standardized testing of height and weight, blood pressure, serum cholesterol, and other health and nutritional status indicators. Through data from these examinations, analysts determine population norms and changes in those norms.

Health care survey

The National Health Care Survey is a new, integrated survey designed to meet the data needs of a changing medical environment. One goal of the National Health Care Survey is to expand NCHS data collection from hospitals, nursing homes, and physicians' offices to include such alternative health care settings as hospices, home health agencies, freestanding surgical centers, and hospital emergency rooms and outpatient clinics. For each major survey component – Hospital and Surgical Care, Ambulatory Care, Long-Term Care, and Provider Inventory – medical and facility records provide the basic data.

Through an integrated cluster sample approach, the National Health Care Survey will provide greater opportunities for integrated data analyses among the various health care settings. The survey also will collect data annually in each setting and provide for patient follow-up studies on quality of care.

NCHS will implement the National Health Care Survey over a period of years as resources allow. All survey components are scheduled to be conducted annually by 1993. When fully operational, the survey will be a significant resource for monitoring health care costs, the impact of medical technology, and the quality of care provided to a changing American population.

AIDS questionnaire

NCHS is active in data collection efforts on AIDS. In August through December 1987, a questionnaire on AIDS Knowledge and Attitudes was added to NCHS's National Health Interview Survey to assess current levels of knowledge about AIDS and to measure change over time. The

Continued on page 9 column 1

NCHS cont'd

questionnaire revealed widespread misinformation about the risk of AIDS virus transmission through casual contact; however, knowledge steadily improved from August to December. For example, the percentage of adults who thought it definitely not possible to get AIDS or the AIDS virus from living near a hospital or home for AIDS patients increased from 33% in August to 45% in December. The "not possible" responses increased for other activities, including shaking hands with or touching someone with AIDS (up from 22 to 34 percent); working near someone with AIDS (from 18 to 31 percent); and attending school with a child who has AIDS (from 20 to 31 percent).

A similar AIDS questionnaire in the June 1988 National Health Interview Survey contains more detailed questions about the AIDS blood test and about affiliation with high-risk groups. NCHS constantly reevaluates data needs in this area and has already incorporated AIDS questions into other NCHS surveys on family growth and maternal and infant health.

Data releases

NCHS releases its data in public use electronic data files, publications, journal articles, and presentations at scientific conferences and symposia. Catalogs on publications and data tapes are available. Data tapes are released for all major surveys.

NCHS's major published reports include:

- "Health, United States" is the annual report to Congress on the nation's health. Prepared by NCHS with data from government and private sources, it presents trends in life expectancy and mortality, hospital use, health resources and expenditures, and other health determinants.
- "Vital and Health Statistics" reports, a series of more than 500 publications with information from major NCHS data collection efforts, include data from ongoing or periodic surveys, interpretive studies, and new statistical methodology. An example of a report in this series is "Health Promotion and Disease Prevention: United States, 1985," which presents data on progress in 12 health areas, including exercise, smoking, high blood pressure, and injury control.
- "Advance Data" reports are supplements to the series reports with accelerated release of data from NCHS surveys. A recent Advance Data report is "Utilization of Short-stay Hospitals by Patients with AIDS: United States, 1984-86."
- The annual "Vital Statistics of the United States" contains life tables and the most detailed compilation of the country's vital statistics. "Monthly Vital Statistics Reports" summarizes current data on births, deaths, marriages, and divorces.
- "Decennial Life Tables" provides state-by-state and national life expectancy data based on the last U.S. census. A recent decennial publication is "U.S. Life Tables Eliminating Certain Causes of Death."

Readers are invited to contact NCHS for further information on its data, reports, or mailing lists. Write or call the Scientific and Technical Information Branch, 3700 East-West Highway, Room 1-57, Hyattsville, MD 20782, (301) 436-8500.

Manning Feinleib, M.D., Dr. P.H., is director of the National Center for Health Statistics. He is not a member of the Society.

(Ed. note: Robert J. Johansen, Chairperson of the Society's Committee on Government Statistics, has arranged for a series of articles by the heads of four federal statistical agencies on what their agencies produce, some of the problems they face, and sources of information on publications. This article by Manning Feinleib of NCHS will be followed by articles from Allan Young of BEA and Janet Norwood of BLS. An article by Jack Keane of the Census Bureau appeared in the September Actuary.*)*

Enter contest with obscure actuarial tables

The SOA Research Department is sponsoring a contest to find the most obscure, unusual and/or mysterious actuarial table or experience study. The contest will aid the SOA Library's efforts to catalog actuarial tables and experience studies.

So dust off those old books and let us know what you find.

Winners will be selected by the research staff from entries received by January 31, 1989. Winners will have the department's undying gratitude and whatever prize it comes up with. Entries should be sent to "Research Contest" at the Society office.

11th IACA Conference in Munich

by M. David R. Brown

The 11th Conference of the International Association of Consulting Actuaries (IACA) July 3 – 8 in Munich offered lively, informal discussions at business sessions and friendly, enjoyable social events. The Conference was attended by 167 members and 183 accompanying persons from 17 countries, including 24 Canadian and 39 U.S. members.

German members of IACA hosted an opening "Bavarian Get-together" in the famous Hofbrauhaus, complete with "oom-pah" music and Bavarian dancers. The first day's business sessions included panel discussions on the "The World of the Consulting Actuary" and Social Security. Dr. Eckart Windel, a board member of the West German Pension Benefit Guaranty Corporation, also addressed the group. That evening, the Bavarian State Government hosted a reception in the magnificent Kaisersaal of the Bavarian Royal Palace.

On the next day, delegates could choose among tours to Neuschwanstein Castle, Linderhof Castle and Herrenchiemsee Castle, all built for Prince Ludwig. The following two days of business sessions included discussions of national reports from each country represented, plus sessions on investments, pension rights on divorce, money purchase pension plans, actuarial consulting in insurance, AIDS, pension accounting standards, and taxation and surplus issues for pension plans.

At the closing business session, it was announced that Dudley Funnell of Canada will be Chairperson of the governing committee for the next two years, and Chris White of Australia will be Vice Chairperson. The next Conference will be in Auckland February 18 – 23, 1990.

Membership in IACA is open to Fellows of the SOA, CAS or CIA who are in full-time consulting practice. Further information can be obtained from the U.S. or Canadian members of the governing committee at their *Yearbook* addresses. The U.S. members are Charles Beardsley, Barnet Berin and Leroy Parks. The Canadian member is Frank Livsey.

Analyzing employee benefit costs in mergers and acquisitions

by Everett Wong

(Ed. note: This is the second of two articles on the actuary's role in mergers and acquisitions. The first was published in the October Actuary.*)*

Cost analysis

Presumably an actuary engaged in a M&A project already knows how to evaluate employee benefit costs and liabilities. Therefore, this article is focused instead on what to watch out for.

1. Employee data

• Actual employee data (e.g., age, sex, service and pay) are rarely available. Age and service distribution tables, sometimes found in pension valuation reports, may be out of date or may include noncompany employees, who may differ demographically from the seller's employees.

• Allow for data changes up to the anticipated acquisition date (e.g., a rush of retirements may result if employees are offered incentives to retire before the acquisition).

• Identify the different groups of employees or their survivors who may or may not be picked up by the buyer (e.g., active at work, laid off, disabled, terminated vested or retired).

• Be careful when using averages (e.g., average salary when dealing with a Social Security offset or step-rate pension plan).

2. Actuarial assumptions

• Review whether the seller's assumptions are reasonable (e.g., a 5% inflation rate for medical insurance premium or a 10% valuation interest rate for a pension plan with lump sum options based on PBGC rates).

• Take into account the buyer's business plan for the company (e.g., reduction in work force or salary freeze). Cost projections should be based on these revised assumptions, whereas the seller's assumptions may be useful only for negotiation purposes.

• The discount rate or interest rate used in valuing a non-tax-exempt plan (e.g., supplemental pension plan for executives or postretirement health care) should be an after-tax rate.

• Identify the exposure for early retirement. Watch out for assumed retirement age after, say, 62 if there is a supplemental pension or other form of "early retirement subsidy" for retirements before age 62 (because the age-62 retirement assumption would imply that the supplement and the subsidy are "no cost" benefits).

• Plan expenses (e.g., legal or actuarial fees, PBGC premium especially after OBRA, and perhaps even internal administration costs) should be recognized, regardless of whether they are paid by the plan or by the employer. Allow for any increase in expenses resulting from disassociation of the company from the seller (e.g., if the company's pension plan participates in a Master Trust run by the seller, or if a substantial portion of the benefits administration is handled by seller's personnel). Consider the transition costs of establishing new plans for the company, taking out new insurance policies, and setting up the necessary administrative support system.

• The assumptions for the executive plans should be appropriate for this group.

• Medical insurance rates should be appropriate for the employee group being considered (e.g., active versus retired employees, with or without Medicare, composition of single and family coverages, etc.). They should represent the actual cost of insurance rather than, for example, the monthly deposit under a minimum premium or retroactive rating arrangement.

• Beware of distortions in insurance costs caused by unusually large dividend credits or changes in the reserve or underwriting arrangement.

• Although the cost of a bonus or incentive plan is merely a function of where the threshold for payoff is set, it may be difficult to raise the threshold significantly. Consequently, the thresholds and payments in recent years need to be reviewed.

• Is any deferred compensation or other executive benefits program treated by the seller as a "no cost" benefit because the cost is expected to be recovered through corporate-owned life insurance policies?

3. Level of benefit

• Consider how benefits may be changed after acquisition and whether there is any restriction against such changes (e.g., union agreement or a provision in the purchase and sale agreement prohibiting substantial benefit reduction within five years after acquisition). Isolate the cost of postretirement insurance for employees currently eligible for retirement, and find out if the company or the seller has reserved the right to change the plan.

• Is there a history of increasing pensions to keep up with inflation (e.g., periodic updates under a career-average plan or cost-of-living adjustments after retirement)?

• For pension plans of the dollar-times-service type (e.g., $10 per month for each year of service), prepare cost estimates allowing for reasonable future increases in the pension unit.

• Mandated benefit changes (e.g., 5-year vesting of pension starting 1989) should be incorporated in the cost analysis even though they may not be effective yet. The same goes for anticipated future increases in the IRC Section 415 limits and for collectively bargained benefit increases scheduled for the future.

• Watch out for any back-loaded pension formula (e.g., $15 per month for each of the first 10 years of service and $20 per month for each additional year) because it shifts the benefit accruals toward the later years of an employee's service.

• If the seller retains liability for accrued pension benefits, determine the cost effect of recognizing or not recognizing future service with the

Continued on page 11 column 1

Analyzing costs cont'd

buyer for vesting, early retirement reduction and other eligibility purposes.

- Find out if any severance payment or management bonus may be triggered by the acquisition.
- Pay special attention to any golden parachute or change-of-control provision that may substantially alter the benefit costs. Do not overlook any penalty tax on gold parachute that is picked up by the employer, which would require substantial grossing up of the parachute payment.

4. Additional considerations

- Find out if the buyer is contemplating a layoff, window retirement or any event that has a SFAS 88 implication (including any event that may have a substantial impact on benefit costs but does not qualify as a "curtailment" because it will not significantly reduce the employees' future services). If so, the cost impact should probably be included in the purchase accounting adjustment described in paragraph 74 of SFAS 87. This applies even to events expected to take place after the customary "one-year window period" for settling up on acquisition accounting.
- Allowance should be made for anticipated changes in pension funding requirements (e.g., minimum funding under OBRA), accounting rules (e.g., accruing the cost of post-retirement insurance over an employee's active service) or, perhaps, even Medicare coverage.
- Distinguish between intercompany charges and stand-alone costs. For example, if the company participates in the seller's pension plan, the seller may have been charging the company pension cost equal to some percentage of the company's payroll, which may be significantly different from the company's stand-alone pension cost.
- The same benefit can mean very different costs to the seller and to the buyer. This can be caused by a difference in tax rates or tax treatments. For example, medical insurance premiums for former employees of the company are current tax deductions to the seller, but they are capitalized costs to the buyer if it is purchasing only the company's assets. Costs also may differ because the buyer and the seller may have different relationships with the employees. For example, if the seller retains liability for accrued pension benefits, it may end up paying subsidized early retirement pensions to employees who later go to work for the buyer; this would not happen if that liability is transferred to the buyer. These differences need to be ironed out at the negotiation table.
- The value of any "surplus" plan assets must be discounted for any legal restriction against taking out that surplus, the time and expense involved in doing so, the 10% excise tax on reversion of pension assets and any increase in benefits precipitated by the reversion. In other words, there should not be a dollar-for-dollar increase in the purchase price on account of the buyer taking over an "overfunded" plan.
- Many items cannot be easily quantified, and the buyer's best course of action is to negotiate provisions in the purchase and sale agreement that will eliminate or limit its exposure. One example is premium or reserve adjustments due insurance companies. A second example is future workers compensation claims based on loss of hearing, which is quite common among employees who have worked in steel mills. Still another example is outstanding litigations or claims relating to employee benefits. From the buyer's perspective the key is to avoid any uncertain exposure.

5. Important reminder

A point that often needs to be reemphasized is that nearly all cost figures relating to employee benefits are before-tax (even for a nonqualified plan) and need to be adjusted for tax effects. Sometimes strange provisions are negotiated when this point is not understood, as illustrated in the following example:

In one case, the seller agreed to "give" the buyer $X in exchange for the buyer's assumption of the liability for accrued pension benefits of the company, which had participated in the seller's pension plan. The seller had estimated that liability to be $X. Assets would be transferred from the seller's plan to the buyer's plan equal to the present value of actual accrued benefits ($Y), to be calculated when the employee data became available. The purchase price would be adjusted by the difference between $X and $Y. Actuarial assumptions to be used in calculating $Y were not specified, except that they should meet the legal requirements. Overlooked was the fact that both $X and $Y were pre-tax numbers but the adjustment would be done in cash, which meant after-tax dollars to the buyer and potentially tax-free gain to the seller. That resulted in a most unusual situation with the buyer's actuary arguing to minimize the amount of pension assets to be transferred and the seller's actuary wanting to maximize it, exactly the opposite of what one normally expects to see.

Putting it together

Once cost analysis has been completed, the key issues should be summarized and communicated to the people doing the pricing and the negotiation. Secondary issues are thrown in sometimes merely as bargaining chips.

Results must be presented as simply as possible, since most people are not conversant in the fine points of employee benefits. In the heat of a negotiation, things can easily get confused and misinterpreted.

Keep close contact with other people working on the project as events can develop very quickly in a M&A deal. Remember that employee benefits is only one of many issues that figure in an acquisition. Be a team player and work alongside the other professionals involved in the project.

Conclusion

An actuary called in to perform an acquisition review for the buyer must learn to work with limited data and very little time. The related cost analysis should encompass both the liabilities as of the acquisition date and the costs in future years. Effects of alternative provisions that can be negotiated with the seller need to be examined, as well as the buyer's business plan for the company after the acquisition. Key issues should be identified and explained in simple terms to the people doing the pricing and the negotiation. Watch out for hidden costs and help the buyer to avoid any uncertain exposure.

Remember that cost analysis is just the first stage of a M&A project. The negotiation and the closing follow. If all goes well, the actuary may even gain a client after the acquisition.

Everett D. Wong is Senior Manager, Peat Marwick Main & Company.

SOA/COVARA AIDS Task Force

by David J. Christianson

The new SOA/COVARA AIDS Task Force, formed in June 1988, reports to COVARA, the Committee on Valuation and Related Areas. It, as well as the HIV Research Committee chaired by Harry Woodman, was an outgrowth of the Report of the Society of Actuaries Task Force on AIDS, issued in March 1988.

This new task force will examine and report on the principles and techniques for the financial recognition of AIDS for insurance companies, recognizing both statutory and GAAP accounting. Among items to be considered are reserves, the development of new valuation tables, and the role of the valuation actuary. When our research is concluded, we will recommend actions to be taken by individual actuaries, regulators, actuarial organizations and other interested parties.

We hope to direct and guide companies so they can provide for the financial impact of future AIDS claims. We look favorably on the work of the Institute of Actuaries, which published Bulletins 1, 2 and 3 on AIDS. Already United Kingdom companies have set up extra reserves for AIDS, even though the AIDS problem there appears much less serious than in the United States. The Canadian Institute of Actuaries also is studying the issue.

Few U.S. companies have increased prices or set aside extra reserves for AIDS. The main activity has been in the area of underwriting which, though good and appropriate, will be insufficient to fully blunt the effect of AIDS claims. We hope to move away from discussion of exactly how large the AIDS problem will be and instead provide tools to recognize the financial impact of AIDS and motivate others to deal with it.

We expect to issue a report in mid-1989. When preparing companies' 1988 annual statements, actuaries should be guided by the certification required for U.S. life insurance actuaries that reserves held make good and sufficient provision for the unmatured obligations of the company. Information in the AIDS Task Force report dated March 1988 should be helpful.

Task force members are David Christianson (chair), Ardian Gill, Bob Beal, Tom Reese, and Bill Koenig. In addition, Bob Stein, chair of COVARA, is actively involved with the task force. We will expand the task force as needed. Individuals interested in attending meetings or providing input to the task force are very welcome. They should contact Dave Christianson at his *Yearbook* address.

(Ed. Note: The Institute of Actuaries Bulletins 1-3 can be obtained from the Society of Actuaries research department for a nominal fee.)

David J. Christianson is Vice President and Actuary, Lutheran Brotherhood. He is chairman of the SOA/COVARA AIDS Task Force.

Actuarial professorship

The University of Iowa is seeking candidates for The Principal Financial Group Professor of Actuarial Science, beginning August 1989. The Principal Financial Group will supplement the university salary and expense allowance by at least $7,000 a year. The selection process for the position, which requires excellence in teaching and research, will begin January 1.

Applications also are sought for a less senior, tenure-track or tenured position, and for one-to-two-year visiting appointments. Specialties in either life or casualty are acceptable, and a Ph.D. is required for tenure-track appointment.

Send a C.V. and three letters of evaluation to Jim Broffitt, Department of Statistics and Actuarial Science, University of Iowa, Iowa City, IA 52242. Minorities and women are encouraged to apply.

In memoriam:

Alden T. Bunyan FSA 1922
Barrett N. Coates, Jr. FSA 1951

Election committee invitation

The Committee on Elections is beginning the preparation of the first ballot for the 1989 election. On that ballot, Fellows are asked to nominate up to six FSAs for Board of Governors' positions. To aid them, a list is provided of those who are eligible for election and have met specific criteria for committee and other service to the profession. Fellows who have the experience, interest, and time to serve on the Board of Governors may submit their names for consideration. They are cordially invited to summarize their accomplishments and background in a letter to Harold G. Ingraham, Jr., Chairperson of the Committee on Elections, at his *Yearbook* address before December 15.

Important Announcement to Canadian Candidates in the Group Benefits Track

The Course G-420C examination will be a two-hour written answer examination for 20 credits. The increases in credit and examination time for the course reflect a significant increase in the amount of material on the course of reading. The increased credit for Course G-420C results in a reduction from 20 to 10 of the number of credits required from eligible GB electives. Candidates using the 1988 Fall Fellowship Catalog should mark these changes on page 23 of the Catalog.

Candidates with prior credit for Part 10-Canada who elect the Group Benefits track will receive credit for G-420C plus 30 unrestricted electives, instead of G-420C plus 40 unrestricted electives. Candidates using the 1988 Fall Fellowship Catalog should mark this change on page 56 of the Catalog.

A new transcript based on these changes has been sent to each Canadian Associate who is taking examinations, whether or not the Associate is affected, so that everyone will be aware of the change.

Dear Editor:

Differences, derivatives, maturity?

Irwin Vanderhoof's letter in the April *Actuary* showed the first derivative of the present value of an interest-sensitive cash flow with respect to interest rate as

$$\frac{dp}{di} = -v\,(\text{Duration}) + \Sigma\frac{dC_t}{di}\,v^t$$

and suggested that the financial literature does not adequately recognize the second term.

"Duration," as used within the equation, is known as "maturity duration," whereas a widely recognized duration calculation known as "effective," or "option adjusted," duration does use the second term. In fact, the second term divided by price is the difference between maturity duration and effective duration and is also known as the delta of the embedded interest-sensitive option. (Note: "duration" as used above is incorrect; "maturity duration" is the time-weighted present value of the cash flows divided by the price. The equation should be

$$\frac{dp}{di} = -vp\,(\text{Duration}) + \Sigma\frac{dC_t}{di}\,v^t.)$$

Effective duration will differ significantly from maturity duration when effective convexity differs from maturity convexity, i.e., when there is prepayment or call risk; hence, the apparent confusion. However, it is immaterial whether one attributes the interest-sensitive effect of the change in the present value of the cash stream to (1) the second term of the first derivative or (2) the second derivative; they are merely portions of the coefficients of the first two terms of the Taylor series expansion that approximates that present value function. The behavior of the present value function is not attributable to either its duration or convexity. Rather, the duration and convexity numbers are a result of and attributable to the present value function itself.

Charles Silverstein

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I would like to point out that there is an error in the letter written by Irwin Vanderhoof on "Convexity" in the April issue of *The Actuary*.

Irwin wrote:

"$\frac{dp}{di} = -v\Sigma tC_t\,v^t = -v\,(\text{Duration}).$"

That means Duration would be equal to $\Sigma tC_t v^t$.

Apparently, this must be an error because Duration is usually defined as follows:

$$\text{Duration} = \Sigma\frac{tC_t v^t}{p}$$

(using Irwin's notations).

The fact that this error was not mentioned in the subsequent issues substantiates Irwin's point in the letter that many modern financial ideas have not been adequately recognized in the actuarial literature.

Peter W. Ho

Irwin Vanderhoof's response to Peter Ho and Charles Silverstein

I could argue with Mr. Ho that the formula I stated obviously applied for a unit investment. It was, however, a gaffe on my part. My friend Andy Hall pointed it out to me some months ago. Perhaps I should have sent in another letter correcting it. However, I believed it is such an old-fashioned actuarial formula by now that no actuary could be misled and that a correction was not important. Apparently the financial literature considers it a more recent discovery.

Mr. Silverstein's comments require somewhat more response. The point of my little note, perhaps not well stated, was that even within the restricted world of Redington immunization, a term developed that could represent something like the option pricing adjustment to which he refers. However, within that world the term would not represent current thought on option pricing adjustments.

In the Redington world there is only one interest rate, and it can change only by parallel shifts. In this restricted world, if there were a call option, the second term should probably be represented as a Dirac delta function. The value of the series of cash flows will then change as a step function.

Conceptually, it seems to me that the introduction of a more sophisticated option evaluation into the equation could be done by attaching to each cash flow a probability of actualization. The probability, in this case, would not be a default function. It would be a probability that was a function of a series of state variables – the current level of interest rates, parameters of the implicitly assumed interest rate process, etc. A derivative of these probabilities would then exist with respect to the current interest rate as well as the other parameters. It seems to me that this is an easy way of looking at the option pricing models now in use.

I apologize to the readers for my gaffe on the original formula. They have a right to be amused, since I championed the idea in the American actuarial literature. I hope the further discussion resulting from these letters may have value.

Let's hear it for education reform!

Twice recently I have been solicited by members to complain to the Board of Governors about actions taken to upgrade the education of actuaries. To the point that the incessant tinkering with the syllabus I have witnessed in my 30 years as a student is disruptive, discouraging and destructive, I have to concur with them. That trait is simply a symptom of a disorganized technology, intellectual instability and principally educational ineptitude. But beyond that I am compelled to break silence of 20 years and commend the incredible courage, perception, wisdom and vision of this Board and its immediate predecessors. The Board has addressed with creativity uncharacteristic of actuaries the pathetic need to yank the education of the actuary "kicking and screaming" out of the eighteenth century. As Chief Examiner of the profession, it is high time for the Society to get its educational house in order.

That is not to say that the Examination Committee has not been diligent. It certainly has. Its skill and cunning in examining is without peer in the world. But its archaic approach to education makes its title a misnomer. As educators, actuaries are the least erudite of all professions. I enthusiastically welcome a breath of fresh thought regarding the education process.

The anxiety of my colleagues is readily understandable. Due to the myopia that is a by-product of the selection and training process used, they are incapable of contemplating change as creative or valuable. This process has also precipitated "areas where the profession now fails to pull its weight" (Ardian C. Gill, *The Actuary*, January 1988). Rather than being creative and effective leaders

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Dear Editor cont'd

with political eptitude, we actuaries are reactors in our fields of expertise such as health, demographic inequalities, and pension policy (viz., OBRA 1987). As practitioners we are mathematically sound, while PBGC is faced with disaster and Social Security is still a dark mystery to those most affected by it. Still, we want to enjoy the comfort of our ethnocentric intellectual aristocracy. This condescending perspective will continue to isolate and fragment the profession until we learn how to educate.

It has taken an awesome amount of courage and discipline on the part of the Board to try to lead the Society to become an educator. The furtive steps taken so far may not all prove successful – by whatever term success is judged. But they are creatively divergent. If the profession is to be professional in the twenty-first century, somehow it must break the shackles of its ivory tower. Granted, progress or change is discomforting to myself and others entombed in the structures of the past. Nevertheless, a rousing cheer for those with the periscopic perception to visualize what could and should be and the temerity to seize the opportunity to move in that direction. I will applaud your efforts – and continue to pay my dues.

Thomas H. Shelby III

'Just actuaries'

Two consultants, neither of whom are SOA members, met recently with the financial officer of a manufacturing company. The CFO indicated he was considering changes in the design of his benefit programs, including possible pension plan mergers or terminations. He needed some help and said, "Gee, I didn't know you did this. I thought you guys were just actuaries."

I believe an actuary is exactly what this client needs to address the issues at hand. Unfortunately, he doesn't share my view.

Let's all work toward enhancing our public image by actively demonstrating sound business judgment as actuaries. Direct presentation of actuarial issues, analyses and recommendations goes a long way toward educating clients and potential clients. If we make a concerted effort, the future of the profession will be so bright we will have to wear shades.

Harold L. Reed

A few comments on illustrations

I read with great interest Daphne Barlett's letter in the June 1988 *Actuary*. Having worked for years on illustration proposal systems for universal life, interest-sensitive whole life, deferred annuities, and SPIAs, I feel that a few comments are in order:

(1) "A life insurance sales illustration is hardly worth the paper it is printed on."

Not so, in my opinion. The development of illustration proposals has helped us to better understand these products and to design more efficient administration systems to support them. If there was any abuse in utilizing these illustrations, it was probably confined to situations in which an agent was either trying to circumvent the guideline premium limitations or "loading up" the policy in the first policy year to maximize his commission. Fortunately, the tax laws have been refined to deal with the former problem (i.e., IRC Section 7702), while the "Target Premium" concept has taken care of the latter.

As for illustrative gimmicks, an interest rate enhancement every 5-10 years would benefit the policyholders who retain their policies for a long period of time.

(2) "There is more to the actual cost of a life insurance policy than the interest rate."

Scenario testing could play a very important role here. For example, a company that generates the so-called "Vanishing Premium" illustrations on interest-sensitive whole life products could disclose the expected number of required premium payments if interest rates were reduced to the guarantees stated in the policy. Similarly, it would help to see what effect an increase in the mortality charge rates has on the illustrated values if the insurer elects to increase those rates at a later date. I agree that insurance companies do not exist in a vacuum, but I would caution against trying to cover every eventuality in our illustration programs.

(3) "It's time for someone to act in this area, rather than react."

Are you suggesting that the Society establish a committee or task force to study this problem? Or can this problem be addressed by mailing a questionnaire to members of our organization? Will the ultimate result be a set of guidelines delineating professional conduct in the drafting of illustration proposals?

Alan Finkelstein

Reconsider college credit

The purpose of this letter is to urge you to reconsider the decision to allow college credit to be substituted for examinations through Level 2. This issue should be decided by a vote of the entire membership.

A majority of those who responded to the FEM White Paper survey opposed the proposal. After discussing the White Paper with many actuaries from all over the country, I have personally come to the conclusion that the opposition to the proposal among the overall membership may be even greater than among those who responded to the survey.

There is a lot of concern that the Board's decision in this case does not have much support from the membership at large. If a referendum were held and it showed that a majority supported the proposal, the concern would disappear. If, on the other hand, a majority does not support it, we could scrap it now and avoid the bother and expense of having it in place for a short time and then discontinuing it.

Jim Gunderson

Fall continuing education seminars

There are still openings in the following fall SOA seminars. Call 312-706-3545 to register or to obtain registration information.

Reporting and Projecting Federal Income Taxes
November 15-16
Boston

Future of Retirement Symposium
November 29-30
Chicago

Income and Sales Tax Reform in Canada
December 6
Toronto

Managed Care Pricing Considerations
December 6
Chicago

Universal Life
December 7
Chicago

December 8
Washington, D.C.

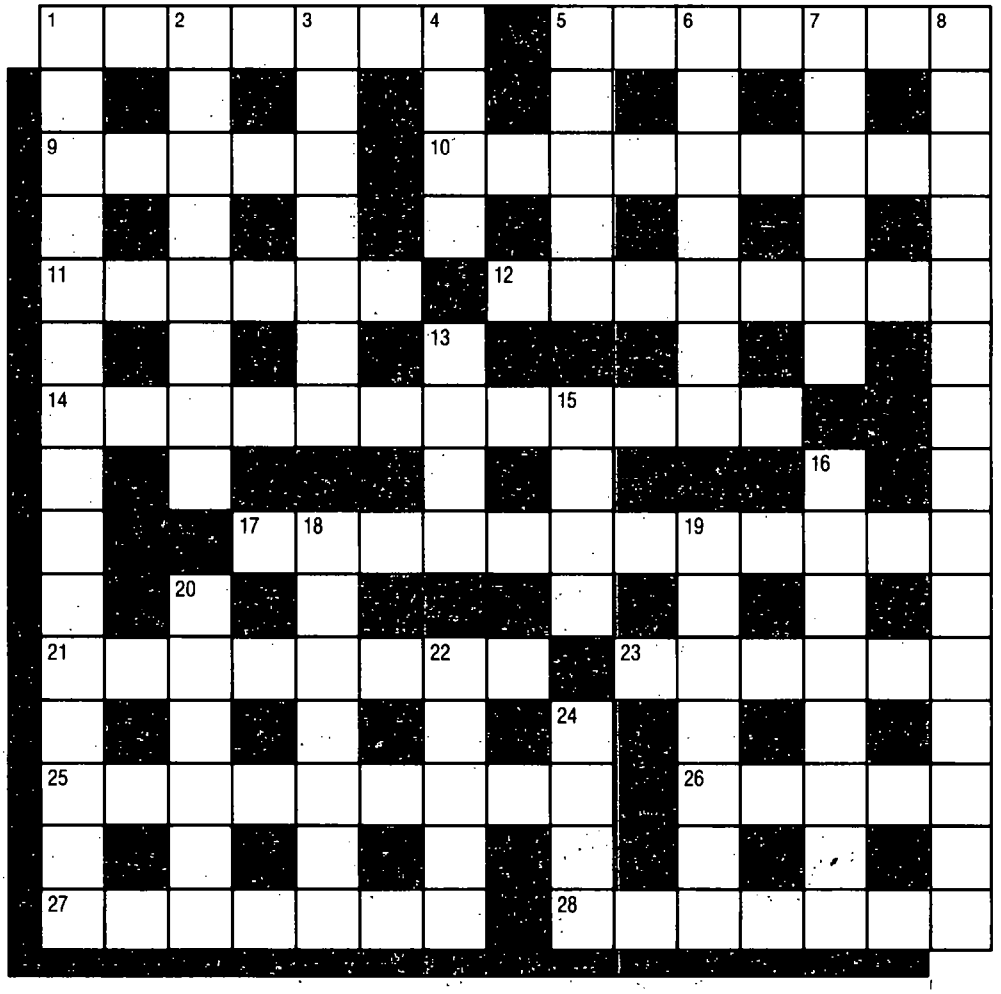
ACTUCROSSWORD

Across

1. Ask about and search for this (7)
5. Medicine one's badly wanting for this (7)
9. Two rings trapped in three directions (5)
10. His name may be on p.66 or his work in the Louvre (3,6)
11. Consumed after nothing and 3.14 it is soothing (6)
12. Precise flower makes a little one (8)
14. Superior position of tennis without publicity (7,5)
17. Rebuke, but not for taking off feathers (8,4)
21. Rate of 7 per ideas changed (3,5)
23. Degree, very loud, the French puzzle (6)
25. Bet amount a puppet (3,6)
26. Fiber of royalist legends (5)
27. Foaming expert of superficial aspect (7)
28. Where money can be found with color round the border (3,4)

Down

1. They change in a haphazard way: modern bars avail, however (6,9)
2. Not quite a fraction: the opposite (8)
3. Pick a little radium: it's complex (7)
4. Ring in an attempt to locate an old city (4)
5. More aged part of citadel derangement (5)
6. Reputedly uncommunicative but they help to make tables (4,3)
7. It returns to state on a proposal (6)
8. Flowing concern of sterner tincture (7,8)
13. They say none of it is good (4)
15. Back to Missouri, it is not done (4)
16. A cent of it could get round ticker tape (8)
18. After a car pile up get another like it (7)
19. Rock in great disarray (7)
20. Fabric returns about beam for 1 across (6)
22. Educate with no preposition: make what you can of it (5)
24. Tidy spirits only (4)



October's Solution

C	A	G	E		D	I	S	N	E	Y	L	A	N	D
O		R		C		W		E		I		L		I
M	E	A	D	O	W	S		S	H	E	R	I	F	F
P		N		U		U		T		L		E		F
U	N	D	E	R		R	E	S	I	D	E	N	C	E
T		T		Y		G			I			R		
E	R	O	S		R	E	A	S	O	N	A	B	L	E
R		U		I		N		P		G		U		N
S	T	R	E	N	G	T	H	E	N		F	L	A	T
C		T				C			F		L		I	
I	M	P	O	R	T	A	N	T		L	E	M	M	A
E		R		S		A		A		O		T		
N	E	O	N	G	A	S		T	R	I	P	O	L	I
C		N		U		E		O		R		S		O
E	L	E	M	E	N	T	A	R	Y		K	E	R	N

100% SOLVERS — ***July*** - ***August:*** W Allison, F Alpert, A Amodeo, J Babb D Maher & A Strand, D Baldwin, J Beaton, M Bennett, T Boehmer, T Bone, M & D Brown, J Brownlee, J Carr, R Carson, G Cherlin, S Colpitts, C Conradi, S Cuba, J Darnton, S Dobronyi, P Watson & R Fovargue, M Eckman, M Ellenby, N Fischer, C & D Friedrich, D & B Funnell, C Galloway, E Goldstick, J Grantier, D Haak, R Hamamo, S Harder, P Hepokoski, R Hohertz, HTI Hogs, C Jacoby, A P Johnson, O Karsten, J Keller, D Kendall, A Keys, K Kildahl, J & R Koch, D Leapman, W Lumsden, D & S Magnusson, J Mair & R Reed, P Marks, R C Martin, G Mazaitis, G D McDonald, J Mereu, H Migotti, R A Miller, C Montpetit, B Mowrey, J Ochrymowych, B Packer, E Portnoy, F Rathgeber, B Rickards, J Schwartz, C & S Shalit, N Shapiro, S Shaw, G Sherritt, Mrs J S Thompson, B & J Uzzell, M Vandesteeg, M & J Verlautz, H. Wachspress, C Walker, C Wasserman, D Weill (also June), M Whitman, A Whiton and D S Williams.

Send solutions to: Competition Editor, 8620 N. Port Washington Rd (312), Milwaukee, WI 53217

ACTUCROSTIC

A. Science of business and commerce.
38 112 219 95 151 60 22 137 212

B. One averse to exertion or work. (2 wds)
182 189 142 206 128 162 234 25 82

C. The outer edges of this page.
3 121 176 90 52 225 150

D. The hot seat. (2 wds)
64 115 233 96 28 135 215 179
80 196 12 154 48

E. Remainder; repose.
168 42 107 211

F. Be just; clean your plate. (3 wds)
43 16 146 103 178 86 230 70 201
124 165

G. Cleric; churchman.
105 33 172 126 191 153 204 14 231
83 141 50

H. The world's greatest waterpower. (2 wds)
180 19 188 110 161 46
171 224 125 200 32

I. Impose; put on; wreak.
4 133 169 73 116 41 205

J. Speak plainly; get down to brass tacks. (2 wds)
111 132 186 8 218 62 85 190 170 238

K. A plane hijacker in the Near East, eg.
228 160 17 106 77 37 210 164 198

L. A necessity on a sailing vessel.
6 207 98 63

M. Correct; meticulous; what we are - sometimes.
7 58 99 40 237 84 149 119

N. One skilled in the law.
15 72 159 177 55 187 30 236
92 136 216 108

O. Authoritative; authentic; referee.
144 166 34 226 130 88 113 183

P. In song they call it an old man.
36 181 93 147 76

Q. A board game for two with dice.
2 202 148 127 139 192 21 101 53 89

R. Casualty portion of a life company. (3 wds)
129 18 232 9 209 97 114 66
221 140 39 156 81 167 194 51 184

S. Speak up; make up your mind. (3 wds)
47 94 131 174 197 117 163 158 227 74

T. Although time was short, they considered it.
104 229 29 49 217 220 157

U. Bits of thread, fluff, etc.
203 44 152 118

V. Symbol; badge; token.
68 13 145 87 185 24

W. Henry Fonda's last film. (with "On") (2 wds)
155 71 193 175 56 208 223 138 10 123

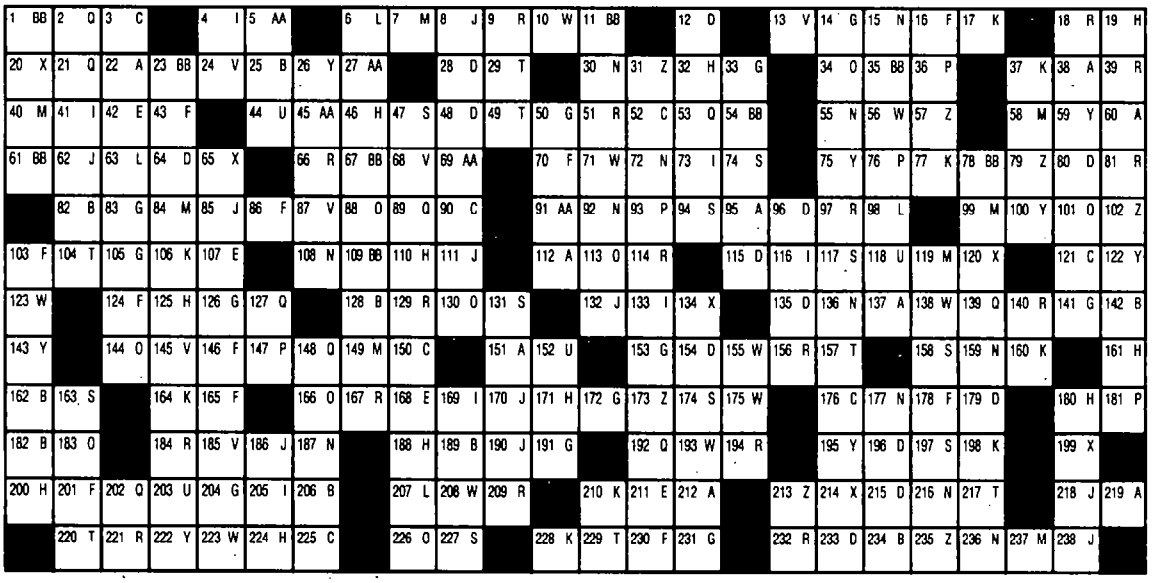
X. Arranged or chosen by pure chance.
65 199 120 134 214 20

Y. Adversary.
59 222 75 100 26 143 122 195

Z. Tense; strained.
79 102 235 31 213 173 57

AA. He was as mean as tyrants are.
45 91 5 27 69

BB. A blend of two vowels in one syllable.
78 1 61 109 23 67 35 54 11



LAST MONTH'S SOLUTION: (Patricia Blake), How Machines Can Defeat People, "It was far from a first encounter with an elegant design that nevertheless flummoxes the user. The designers are guilty of ignoring basic patterns in peoples expectations. The machines abet a perverse law of nature: 'The aim of all inanimate objects is to resist man and ultimately defeat him.' " TIME July 4, 1988.