



The Actuary

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The Newsletter of the Society of Actuaries

VOL. 18, No. 9

November, 1984

PROFESSIONAL SERVICES

by James A. Attwood

Ed. Note: A NEW SERIES. The following article is the first of a new series. Outgoing President, Dwight Bartlett, asked Executive Committee members, particularly the Vice Presidents, to use these columns to tell about activity within their assigned areas. Incoming President, Pres Bassett, heartily endorses this concept and hopes that the councils of the various Sections will do likewise.

This series of articles may be expected to appear in about half the future issues over the next two years, and will be the special responsibility of Julius Vogel, a Past President of the Society and Associate Editor of *The Actuary*.

Dwight Bartlett asked each of his four Vice Presidents to tell readers of *The Actuary* what is occurring within that officer's area of responsibility. The area assigned to me is that of Professional Services.

Unlike the better-defined areas reporting to other Vice Presidents, that of Professional Services has no over-all Policy Committee. This is probably because the six Society Committees classified under Professional Services (listed on page 19 of the Yearbook) do not form a cohesive whole. One of the stated purposes of the Society is to provide programs and facilities for the professional development of its members. The six Committees each have a part to play in the accomplishment of the objective, but otherwise they are dissimilar.

The Guides themselves are the primary product of the Committee on Guides to Professional Conduct. The most recent version appears on page 35

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ELECTIONS 1984

The results announced at our Annual Meeting in Toronto are:

President-Elect

Richard S. Robertson

Vice Presidents

Gary Corbett

Samuel H. Turner

Secretary

Richard V. Minck

Treasurer

Michael B. McGuinness

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Donald D. Cody

W. James MacGinnitie

R. Steven Radcliffe

James F. Reiskytl

The number of votes cast, from among 5213 eligible voters was 2,635 (50.5%).

In 1982 and 1983, these percentages were 52% and 51%.

Call for Papers

1985 Annual Meeting of The American Risk and Insurance Association

Vancouver, British Columbia

You are encouraged to submit a proposal for a presentation at the 1985 ARIA meeting. Proposals should include: title, purpose, research methodology, and a timetable for completion of the paper.

The deadline for submission is: January 15, 1985. Submit proposals to the ARIA Vice President and 1985 Program Chairman:

J. David Cummins
The Wharton School
3641 Locust Walk/CE
The University of Pennsylvania
Philadelphia, PA 19104

MACHINES AS AIDS TO ACTUARIES UP TO 1914

by E.J. Moorhead

This is a collection, undoubtedly incomplete, of items about actuaries who many years ago saw the need and opportunities for calculating and tabulating equipment in their work.

1. In 1869, Walter C. Wright of Boston (20 years later to become a charter member of the Actuarial Society) published an announcement reading thus:

The Subscriber proposes to supply, to order, Life Insurance Companies, Statistical Bureaus, and Offices that require a large amount of numerical operations, an instrument called the "ARITHMETER", to facilitate Multiplication and Division, invented by his father, and abundantly tested by him both in his private business, and as Insurance Commissioner of Massachusetts. The construction and proper graduation of one of these instruments on a scale sufficiently extensive to make it a practical substitute for the logarithm table, is a matter of considerable expense, involving a large amount of painful and skillful labor. But the instrument once finished is permanent, always ready, and equivalent, when there is full work for it, to the labor of several computers, especially in the valuation of policies, ascertaining the ratios or percentages of numbers, and distributing surplus, especially on the contribution plan. The price of the instrument is \$600. — one-half in advance ...

Mr. Wright's father was the eminent Elizur; the "several computers" were people, not machines; and, the last we

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The Actuary

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The Society is not responsible for statements made or opinions expressed herein. All contributions are subject to editing. Submissions must be signed.

EDITORIAL BY THE PRESIDENT

Preston C. Bassett

COMMUNICATING SKILLS

Of the many skills an actuary may have or develop beyond the F.S.A., the skill to communicate effectively is probably one of the most important. It is at the heart of what happens everywhere. And for people who need to understand each other's point of view, it is essential. This was recognized over forty years ago when Edmond Whittaker wrote "... unless he (the senior actuary) can convince the other members of the executive family that he is right he might just as well be wrong." Mr. Whittaker, who for many years was responsible for hiring actuarial students for The Prudential Insurance Company, was talking about the ability to communicate in order to survive in the business world.

Other companies have not overlooked Mr. Whittaker's philosophy. One of the largest consulting firms recently advertising for actuarial students requested "We require 3 + exams and actively pursuing FSA with excellent communicating skills." At one time a large insurance company required all new FSA's to take the Dale Carnegie course "How to Win Friends and Influence People."

With all the other things an actuary has to learn, however, how does he or she also develop these communicating skills? At various times in the past the course of study for attaining the F.S.A. attempted to test communicating skills with limited success. The essay exams in parts 6 through 10 could be used currently for this purpose but were not developed with this in mind.

If communicating skills are so important, why doesn't the Society include this topic in its exam structure? There are several reasons.

1. Many actuaries already have developed these skills through prior education and experience.
2. There is so much material to be covered in the Actuarial exams we hesitate to add more.
3. Some feel that communication is not an actuarial topic.
4. Communicating skills are difficult to test outright, perhaps more so by a team of actuaries working on a voluntary basis.
5. Many fine courses are available from outside sources such as correspondence courses or adult education programs. The Society would be repeating what others are already doing, probably better.

This topic has not been totally ignored by the Society, however. Several times in the past there have been teaching sessions on oral and written communications at Society meetings. There will be another held at our spring meeting in Quebec. These sessions are structured to give you an introduction to these important skills which you may wish to develop further. □

THE E. & E. CORNER

We ordinarily devote this column to questions raised by students and answers from the E. & E. Committees. For this issue the questions come from members of the Chicago Actuarial Club, and the answers from James C. Hickman, one of the five authors of the new text *Actuarial Mathematics*. Other questions and answers about the same work will be found in the 1983 annual meeting issue of the *RECORD*.

1. (Q) Why are the tools used in *Actuarial Mathematics* limited to those developed in Parts 1, 2, and 3 rather than having Parts 1, 2, and 3 cover the tools used in *Actuarial Mathematics*?

(A) Since World War II, the SOA has attempted to keep the basic examinations near the mainstream of what is taught to undergraduate students at major universities in the U.S. and Canada. The goal has been to make entry into the actuarial student program available to a broad group of students without special training.

2. (Q) At the time the team outlined *Actuarial Mathematics*, how was it anticipated that the book would be used?

(A) The authors team viewed Volume I (Chapters 1-13) as containing the basic mathematical models that all actuaries should know. Volume I contains an introduction to the economics of insurance, individual risk theory, basic life contingencies, and collective risk theory. In particular, the authors hoped that students of the SOA and CAS would study Volume I. Volume II, Chapters 14-19, was viewed as being of interest to actuaries concentrating in life insurance and pensions. This volume will cover expense considerations, nonforfeiture values, dividends, premiums for complex policies, including those where benefits may depend on investment performance, advanced topics in multiple life contingencies, population theory, and pension funding. □

Professional Services

(Continued from page 1)

of the Yearbook. Guides are continually under review, and closely coordinated with the Academy. Detailed standards of practice are no longer considered to be part of the Guides, and are now the responsibility of other actuarial bodies. An important development regarding standards will be noted later.

The Committee on Complaints and Discipline is the Society's means of making its Guides effective. The role of this Committee is the discipline of those few Society members who fail to measure up. The Committee on Complaints and Discipline, like the Election Committee, is chaired by a Past-President, an indication that this Committee acts more independently than most. Paul Barnhart is the current Chairman. The work of this important Committee was described in the December, 1982 issue of *The Actuary*.

The Committee on Professional Development has been active in getting new members attuned to the professional side of an actuary's work, through new associates workshops and new fellows luncheons. It sponsors workshops and teaching sessions for established actuaries as well. Recent efforts have been directed toward improvement in communication skills. Our new President calls attention to the importance of good communication in the editorial in this issue of *The Actuary*.

Applications for admission to Society membership are the province of the entirely ex-officio Committee on Admissions. The very few non-routine matters that come before this Committee are largely matters of waiver of Society exams when a candidate has passed equivalent exams in other actuarial bodies.

The Committee on Theory of Dividends and Other Non-Guaranteed Elements in Life Insurance and Annuities has completed a draft report on Non-Guaranteed Elements, as a companion to its final report on Dividends. An open meeting to discuss this Committee's new recommendations was held in Toronto in October.

The Public Relations Committee is chaired by Daphne Bartlett. Much of this Committee's work during 1984 has

been in the direction of internal public relations, efforts primarily directed at our own members. A new Speakers' Kit, recently produced by this Committee, includes information on speech writing, delivery, visual aids, and even the handling of nervousness. This Committee is also working on the possible improvement in the publication process for the *Transactions* and the *Record*.

In this capacity the Public Relations Committee is endeavoring to help the Publications Committee, chaired by our Director of Publications. The Publications Committee is one of those that reports directly to the President, and is not shown under the Professional Services label. No report on Professional Services within the Society can overlook the work of the several editors of Society publications. Without the *Transactions*, the *Record*, or *The Actuary*, the Society's professional services would be skimpy indeed.

Important as the formal Committees of the Society are, not all of the professional activities in and around the Society emanated from within.

A very important proposal coming from the Academy's Standards Implementation Committee would set up a semi-autonomous Actuarial Standards Board, responsible for the development of standards for actuarial practice within the United States. This proposal has been discussed by the Executive Committee and the Board, and has been presented to some of the local actuarial clubs. As of the date of this writing it has not yet been acted upon.

Complementing the Academy Committee is a Society Task Force on Actuarial Principles. The Task Force, headed by Bob Lindsay, has the mission of recommending the Society's role in establishing actuarial principles and how this role is to be performed. It was suggested by some actuaries that perhaps the Academy's role is to determine standards of practice, whereas the Society has the responsibility for determining actuarial principles. This Task Force report should help the Society Board decide whether this division of responsibility is appropriate and feasible.

The role of the Valuation Actuary, another professional matter, is the subject of an August report of the Joint Academy/Society Committee under the chairmanship of Gary Corbett. This important report is available to all who ask, through the Itasca office. □

BEYOND TRIVIA

Cashing in on the trivia craze started by the game Trivial Pursuit, Don Hodes & Associates in Worcester, Mass. is now churning out customized trivia for almost any occasion. The company offers trivia for financial institutions, trivia for dental industries, and even trivia for insurance companies. Here's one possibility suggested by the Boston Globe, the source of this item. Name 12 renowned people who at one point worked for insurance companies. Answer below. □

NOVEL STUDY NOTES

The study notes for Part 4 for the May 1985 exam will take on a new look. The Education Committee of the Society of Actuaries has contracted with Don Jones and his associates at the University of Michigan to develop a set of basic programs for the IBM PC to perform the calculations needed to work the problems in the new life contingencies textbook. The purpose of these programs is to enable students to concentrate on the text and reduce the amount of manual calculation provided they have access to a personal computer. The programs are written for the IBM PC, but the BASIC code is provided and it should be relatively easy to convert to other PC's.

This is the first small step to use emerging technologies and it will be carefully monitored. Godfrey Perrott (Chairman of the Technology Task Force of the Future Educational Methods Committee) will be happy to receive comments on this approach at his yearbook address.

Answer: According to "The Book of Lists"—George Eastman (inventor), Charles Ives (composer), Wallace Stevens (poet), Franklin Pierce Adams (journalist), Franz Kafka (novelist), Col. Harland Sanders (of fried chicken fame), Warren E. Burger (Supreme Court justice), Mildred "Babe" Didrickson Zaharias (athlete), Spiro Agnew (former Vice President), Medgar Evers (civil rights leader), and Jody Powell (former press secretary to Jimmy Carter).

There's hope for us yet. D.A.P.

LETTERS

Exams
Sir:

In the June issue E & E Committeemen Murphy and Huntington have proven that history again repeats itself. Given the opportunity to conduct certain exams on a joint basis with other actuarial organizations, the E & E Committee, in the questionable wisdom of continuing the disproved 'body count' theory and reflecting the myopic vision of an earlier transition period (during which the same result occurred), has elected to ignore the reality of governmental credential licensing and a competing actuarial organization (ASPA) and chosen to dilute the meaning of FSA.

By establishing its pass mark below that set for the EA exam, the Society has made it necessary for any aspiring EAs among the unfortunate 48 who were passed by SOA but failed by JBEA to take yet another exam. Becoming an FSA no longer suffices.

Is it not time for the SOA to realize that the federal government and ASPA are realities? Is it not time for the SOA to work in the real world? What the E & E Committee has done is to play into the hands of ASPA, who can claim that its exams are the more difficult. Now, this is true for at least one exam.

It would seem that E & E has just failed the most important test of all — reality. On the other hand, is this result so surprising?

Peter N. Campbell

Sir:

I would like to voice my opinion on what I feel to be an unfairness in the current Associate exam transition. Under the current setup a student who passed the old Part 4 must now sit for another separate exam 4C to receive full credit for the new Part 4.

A student with no previous credit takes the new Part 4. This student has the material from the 4A and 4B portions to aid in passing. Foreseeably a student could score high on these two portions, score only the minimum standard on 4C, and receive a passing grade.

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A SEQUEL TO "MOVING ON"

by Beda Chan

Recall the model in *Moving On* (January, 1984) which describes a strategy for multiple choice examinations. The assumptions: Each question needs to be seriously screened for S minutes. After screening, the working time W needed to work out the question is then known. Total time T for the question is thus $T = S + W$. The ability of a candidate, measured by the average time per question $E(T)$, is considered fixed. The strategy: After spending S with a question and W is then known, move on to the next question if W is too large, i.e., if $W > \tau$. The problem is to find the best τ . The following result covering cases more general than that in *Moving On* is proved in "Fixed Points and Exam Taking Strategy" by Thomas O'Brien, a professor at Bowling Green State University, to appear in the American Mathematical Monthly.

THEOREM: Let $E(S) = \gamma$ and the probability density function for W be g.

(i) With strategy "move on if $W > \tau$ ", the total time per worked question is

$$\phi(\tau) = \frac{\gamma + \int_0^\tau w g(w) dw}{\int_0^\tau g(w) dw}$$

(ii) The τ that would minimize $\phi(\tau)$ is determined by $\frac{d\phi}{d\tau} = 0$, which simplifies to

$$\phi(\tau) = \tau$$

In the case presented in *Moving On* where

$$E(S) = \frac{1}{\lambda} \text{ and } g(w) = \beta e^{-\beta w}, \phi(\tau) = \tau$$

$$\text{simplifies to } \frac{1}{\lambda} + \frac{1}{\beta} = \tau + \frac{e^{-\beta\tau}}{\beta}$$

In *Moving On*, the term $1/\beta$ was missing from the right side of the equation. The table presented there should thus be corrected as follows:

$1/\lambda$	$1/\beta$	$\phi(\tau)=\tau$	Answers	Screens
1	5	3.53380	50.94	100.51
1.76373	4.23627	4.55426	39.52	60.00
2	4	4.79316	37.55	53.78
2	5	5.25048	34.28	52.73
2.12479	4.87521	5.38437	33.43	50.00
3	4	6.13768	29.33	37.39
3	8	8.08982	29.67	46.63
3.57249	7.42751	8.69680	27.60	40.00
4	7	9.08938	26.40	36.32
2	8	6.40974	46.80	84.91
2.93955	7.06045	7.59044	39.52	60.00
3	7	7.65481	39.19	58.94

The first three blocks are as explained in *Moving On*. The fourth block says a part 4 or 5 candidate with speed of 10 minutes per question (answering 30 out of 60 in 5 hours) can improve to answering 40 questions by screening a question for 2.9 minutes and drop it if it takes more than 7.6 additional minutes to finish.

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A Sequel To "Moving On"

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Now some brief explanation on how the table is prepared. For example, in the case of part 1 where time given per question is 3 minutes and the candidate's speed is 6 minutes per question, the optimal strategy is determined by

$$\phi(\tau) = \frac{\gamma + \int_0^{\tau} wg(w)dw}{\int_0^{\tau} g(w)dw} = \tau$$

$$3 = \tau \cdot \int_0^{\tau} g(w)dw$$

$$6 = \gamma + \int_0^{\infty} wg(w)dw$$

When g is a one parameter density function such as the exponential of mean $1/\beta$ considered above, the three unknowns β , τ , and γ are determined uniquely by the three equations. The proof of the above equations and the theorem is straightforward following the reasoning in *Moving On*. \square

STARGAZERS

Our enquiry (Jan. issue) about actuaries who, like several of our professional forebears, have an interest in astronomy, has yielded these responses:

Alfred L. Buckman taught astronomy from 1933 to 1949 (coincident with practicing as an actuary) in the Extension Division of University of California. In his senior year at UCLA he had worked weekends on Mount Wilson taking spectra of stars and nebulae in a research program conducted by Caltech's Prof. Ira Sprague Bowen.

Norma J. Coufal is "very much a beginning astronomer, having just got an 8-inch Schmidt-Cassegrain".

Charles G. Groeschell entered into an audit program which he enjoyed, but, alas, ran out of time. He has a dozen good astronomy textbooks at his elbow.

Gordon G. Myer has a lifelong interest after taking courses in his university days, and is a member of the Royal Astronomical Society of Canada. He looks through his small telescope occasionally.

Harry Ploss says that his English Literature professor suggested he become an astronomer; he did study astrophysics in graduate school, but fortunately discovered in time that the

actuarial profession has the characteristics that his professor attributed to astronomy.

Frederick W. Sawyer III had three articles published in American and British astronomical journals while he was taking actuarial exams, but after that his time for astronomy ran out.

Keith P. Sharps said: "This seems to be a well-trodden path, especially among actuaries in or from the British Isles. Geoff Chaplin FIA has a Ph.D. in cosmology and still peers through a small telescope in his Surrey garden. Nicholas J. Hudson AIA used to be secretary of the Cambridge University Astronomical Society, a post that I held after him. I have a master's degree in astronomy from University of California. Phelim P. Boyle FIA has a Ph.D. in General Relativity from Trinity College, Dublin; he suggests that the link between the two professions is related to the resemblance, where flow of money is concerned, between pension plans and black holes."

Ed. Note: We welcome all the above evidence that the link between matters actuarial and those astronomical hasn't been severed. But surely there are other amateur astronomers among our members who will let us hear from them.

Letters

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The student who passed the old Part 4 has already demonstrated proficiency on the 4A and 4B portions; but he must score much higher on the separate 4C to receive credit for the new 4. I fail to see the equity. A student is penalized for passing. I ask you, is that fair?

Brian N. Rees

Sir:

I am finally finding time to reply to the letter from Peter Fox, Jr. questioning our exam system. (December, 1983)

1. If I were just starting out, I *would* undertake the exams. Starting out implies both a naivete about the effort required and a high energy level. *Everybody* starting the process expects to pass each exam on the first attempt (because they have never failed anything).
2. I do unreservedly recommend our process. I occasionally speak to college math groups and *do* explain how tough it is. I encourage sophomores and juniors to try an exam or two; we know how helpful an exam credit is in getting a job.
3. I haven't been involved enough to consider whether the low number of Part 1 takers is temporary. I encourage any of us to meet with college math students, if only to let them know we are here. A lot of my colleagues started out as teachers — because they didn't know how to spell actuary.

I do agree the syllabus is far from perfect. I recognize that I had no real fear about the exams until I was beyond them. But the actuary remains *the* insurance/pension professional; and it is *necessary* that we be forced to learn a lot of material.

Steven C. Frechtling

Paradigms

Sir:

There has been lots of talk of actuarial paradigms and actuarial-scientific revolutions. At the recent New York regional meeting of the Society, a new paradigm may actually have been emerging. In the midst of discussing

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Letters

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new investment alternatives such as interest rate futures and financial options, it became apparent that insurance companies have been dealing in such contracts for years, not on the investment side, but as relatively unsung aspects of basic insurance policies.

For example, the fixed-dollar cash value contained in permanent life insurance contracts amounts in effect to a "put contract" issued by the insurer to the policyholder. This "contract" obligates the issuing company to "buy" the insurance contract back at a fixed price at any time in the future. Since the value of an insurance contract (present value of future benefits) tends to decrease as interest rates increase, above some interest rate this "option" is "in the money", and, all things being equal, the policyowner can improve his or her position through exercise of the surrender option.

Similarly, the deferred annuity contract with a bail-out provision involves the sale of a straddle. Most of the time, in fact, it seems that the insurer has gotten into the position of issuing uncovered call options or straddles — highly speculative activities. "Calls" are also sold, however: witness the rights to make future deposits in window GIC's and universal life.

While the technology is fascinating, the real advantage of this recognition — and the change in actuarial paradigm — would accrue if analytic pricing (and reserving) models could be developed, similar to the Black-Scholes and other more advanced securities models. Such models might replace or at least enlighten the scenario testing currently employed to measure C-3 risk. One problem is the "open" nature of insurance-contract options: there is no exercise date.

Arnold A. Dicke

Feuding?

Sir:

Are internecine feuds, such as those in the letters of Julius Vogel (February) and David Carpenter (June), really to the benefit of either actuaries or the insurance industry? I think not. Being proud of one's (past or present) affiliation is one thing, but to carry these feel-

ings to the point of hubris is quite another. We need only look at the united effort put forth in opposition to unisex pricing to see that we are sometimes capable of looking past whatever differences may exist.

Michael Khalil

What To Call Our Newest Textbook

Sir:

I accept Ralph Edwards' challenge (April, 1984).

Non-obscene? I believe so.

Good? Maybe.

Permutations of the consonants? One.

Added vowels? Two.

My entry: BiG JoHN

Robert H. Hoskins

OUR SECOND GENERATION

An interesting sub-set of actuaries is made up of those with actuarial parentage. We have done no research on what we will here call *second generation* actuaries, but our attention is continually drawn to individual situations. Especially intriguing, because of prominence within our profession, are these:

The late Robert T. Jackson, Society president in 1977, was the son of Henry H. Jackson, president of the American Institute of Actuaries 35 years earlier.

Robert H. Hoskins, president in 1982, is the son of James E. Hoskins, Society president in 1960, and a Fellow since 1920.

It is unprecedented for this newsletter to speculate about election results, and doubly strange that the speculation and the results appear in this same issue. We trust that readers will realize that this note was written after we had seen the final ballot, but before the polls were closed.

We hereby go on record that (1) the odds favor the proposition that the 1986 Society president is once again from our second generation, and (2) there is a better-than-25% chance that a newly elected vice-president is.

Readers with an adequate knowledge of actuarial genealogy will be able to confirm or disapprove our speculations forthwith.

C.L.T.

1985 AERF GRANTS COMPETITION

The Actuarial Education and Research Fund (AERF) is sponsoring a 1985 grants competition. One or more grants, totalling up to \$10,000, will be available to support actuarial education or research projects. Funds may be used to compensate recipients or cover expenses for services used to carry out the project.

The goal of the competition is the production of publications which will advance actuarial science especially in regard to practical applications. For this purpose, proposals are invited from members of the actuarial organizations supporting AERF, from faculty members of a U.S. or Canadian university or college who have teaching and research responsibilities in the actuarial or related fields, and others qualified by knowledge and experience to contribute to the goal.

To begin application, a letter should be submitted to the AERF Research Director outlining the scope of the proposed project. The Research Director will then supply further information on applying for a project grant, and application forms.

Completed applications will be due by February 1, 1985 and will proceed to an Awards Committee drawn from the actuarial and academic professions. Awards will be announced in April, 1985.

Correspondence should be addressed to Cecil J. Nesbitt, AERF Research Director, Department of Mathematics, University of Michigan, Ann Arbor, MI 48109-1003.

ACTEX STUDY MANUALS

Study manuals are available for all May 1985 exams, except Part 10. Those for Parts 4BC, 6, 8, and EA 1 are new, others are prior editions. Particulars, if not in your company, from: ACTEX, Box 1260, Plymouth, MA 02360. Note new address.

Richard A. London

QUANTIFICATION OF A FUNDAMENTAL ERROR INVOLVED IN "ACTUARIAL" ANALYSES MADE BY NON-ACTUARIES

by Robert J. Myers

From time immemorial, actuarial students have learned early in their education that valuing a life annuity by using the amount of an annuity-certain for a period equal to the expectation of life is erroneous, producing an overstatement. This is rigorously proved in a quantitative manner in C. W. Jordan, "Life Contingencies" (second edition, Society of Actuaries, 1968) — and also for actuaries of Ancient Mariner vintage, in their actuarial bible, E. F. Spurgeon, "Life Contingencies" (third edition, Cambridge University Press, 1932).

Non-actuaries find it appealing to take shortcuts when they attempt actuarial calculations. One of these is to assume that everybody now aged x will survive for a number of years equal to their expectation of life and then all drop dead. Another is the erroneous procedure mentioned previously with regard to calculating annuity values. Nowhere, however, has this actuary seen any quantitative analysis of the error therein involved. Without such facts being demonstrated, non-actuaries might complain that actuaries were being critical of their methodology only on theoretical grounds, and that no significant error was present in their shortcut — and simple — procedure.

We can all readily observe that, if the interest rate is zero, then the annuity-certain method gives precisely the correct answer. Let us consider the situation under the U.S. Total Persons Life Tables for 1969-71 at various interest rates. As the following table shows, for a given age the relative excess, or error, increases slowly to a peak and then decreases — until eventually, for an infinite interest rate, the annuity-certain method produces the correct result (namely, zero, except for an annuity with first payment on the valuation date).

The relative error, as would be expected, becomes larger as the expectation of life for the valuation age increases. For those at the retirement age of 65 (which is often the area where non-actuaries tread in making these calculations), the relative error can be as much as 10% at moderate rates of interest.

The maximum value of the error is reached at about 3% interest for females age 20, at 5½% for females age 40, at 4½% for males age 20, and at 6% for males age 40. The author did not attempt to find the relatively high interest rate where this peak occurs for age 65, but apparently for females it is about 10% (but well less than 20%, for which a calculation showed only a 5.3% excess). The peak for males age 65 is probably close to 15%.

One other subsidiary calculation made was the error for a 1% interest rate for the category with the largest expectation of life shown by these tables — namely, females age 1. The excess in this case was only 1.6%.

I now leave it to my younger colleagues, who are closer to their mathematical training and computer expertise than I, to extend this analysis in theoretical directions as compared with merely taking cases.

RELATIVE EXCESSES OF ANNUITY-CERTAIN FOR EXPECTATION OF LIFE OVER ACTUAL ANNUITY VALUE, U.S. TOTAL PERSONS LIFE TABLES FOR 1969-71

Interest Rate	Females			Males		
	Age 20	Age 40	Age 65	Age 20	Age 40	Age 65
1%	2.1%	2.9%	4.7%	2.7%	3.6%	6.0%
2	2.7	4.0	6.2	3.7	5.0	9.0
3	2.9	4.7	7.4	4.1	6.0	9.4
4	2.8	5.0	8.5	4.2	6.6	10.8
5	2.7	5.1	9.4	4.2	6.9	11.9
6	2.4	5.1	9.9	3.9	7.0	12.9
7	2.0	5.0	10.5	3.6	6.9	13.7
8	1.8	4.7	10.8	3.2	6.8	14.4

Editor's Note: The author now informs us that he is "not the only one to re-invent the wheel". Papers by William Lumsden and Murray Projector explore similar matters in PCAPP. □

COMPETITION RESULTS

Esther Portnoy and Robert D. Hohertz are our co-champions! They solved all ten Actucrossword puzzles correctly for the last fiscal year (Sept. '83 through June '84). Christopher Doyle was next with nine correct solutions, while Sheryl Cuba, Bernard Packer and Joseph S. Raich made the list eight times. These solvers may nominate some non-member to receive a free copy of *THE ACTUARY* through June, 1986 by sending the name and address of their nominee to your C.E. with their next 100% solution.

87 members (or their wives, children, parents, associates or friends) sent in 269 solutions. The number varied from only 12 in March (only 4 were correct—see below) to 46 in November. For the year, 4 out of 5 solutions were correct — as against 5 out of 6 for the previous year. A remarkable feature of the year's results was the fact that almost one-third of the solvers (28 of the 87) submitted only one correct solution and then were never heard from again. Does this mean they had something to prove, proved it, and then went back to work?

The most interesting problem for our solvers came from Clue 28-Down in the March puzzle which read: "Flower love in this cape (4)". With "d" as the second letter and "e" as the fourth, the correct answer was "idle". Seven of the eight solvers who didn't get 100% missed only this clue as follows: Three had "edge" with two comments — "?!!?" and "Just a guess, I haven't the foggiest notion what the word should be". Two changed the second letter to "r" and made the love "true" and "free". Another used "rose" with a comment to the effect that the puzzle seemed to be in error, while the seventh left it incomplete and commented that neither edge, edge, nor idle seemed to fit.

Our wily constructor, Graham Deas, gives the rationale as simply "love-in-idleness" which is defined by Webster as the wild pansy, and "ness" in turn is a cape. While this seems to have proved difficult, it looks fair to him and he's still rather pleased with it. This seems to suggest that we should give the rationale behind some of the more difficult clues when we give each month's solution. Something along this line has been suggested by a number of solvers and your C.E. will do so in the future to the extent that space and time will permit.

Machines As Aids

(Continued from page 1)

knew, one of these Arithmeters was on display in the actuarial department of the New England Mutual Life.

2. The New York Tribune in 1890 reported an Actuarial Society meeting of April 25th at which prospective uses of the recently announced Hollerith equipment were discussed. It was mentioned that Prudential of Newark expected to use the machine.

3. In 1894, John K. Gore, then a 30-year-old assistant actuary of the Prudential — he became an Actuarial Society member in 1896 and its president in 1908 — patented an “apparatus for sorting cards and compiling statistics”, said to have been “used continuously for more than 35 years during which (the company) built up a record of saving perhaps unparalleled by that of any other office machine or system ever used”. In a 1978 report, Prudential’s Blair E. Olmstead wrote that the basic Gore machine was a sorter which operated at an average rate of about 15,000 cards per hour. After sorting, the cards were counted using an International Postal machine which operated at the rate of 850 cards per minute.

There exist many illustrations of Mr. Gore’s extraordinary ingenuity. A 1937 letter says:

Prior to the invention of his machine he had brought manual processes to a high degree of refinement. For instance, his clerical staff was instructed how to riffle a convenient lift of cards evenly and count them by listening as they were snapped under the thumb . . . And in adding also, many ingenious methods evolved (including) the so-called Nicholson method. Nicholson found that there were only 165 possible combinations of 3 significant figures, and taught students to regard these combinations very much as a combination of letters is subconsciously regarded as a word. For example, “cat” is interpreted as a word, not a mere succession of letters; similarly Nicholson system users would interpret the figures 7, 8, 9 as 24 without any thought whatever of its component parts. In short, the 165 combinations were memorized, becom-

ing a sort of word-alphabet. . . . Clerks attained a dexterity and facility in handling cards and making simple calculations that in this day would seem unbelievable.

4. Geoffrey D. Austrian’s 1982 book, **Herman Hollerith: Forgotten Giant of Information Processing**, contains only a few references to life insurance uses, but its dust cover displays an early 45-column card of an unnamed life company. Five life companies — Mutual Benefit, New York Life, Phoenix Mutual, Prudential and Travelers — are identified as having displayed early interest in Hollerith’s invention.

5. The index to the first 15 volumes of the old Transactions lists the following relevant papers:

- Tate’s Arithmometer, An Improved Quotient Register, by M. H. Peiler (Aetna), Vol. II, 1891
- Some Uses for the Hollerith Machines, by H. N. Kaufman (Phoenix Mutual), Vol. XI, 1909
- Installation of a Perforated Card System, by P.C.H. Papps (Mutual Benefit) Vol. XV, 1914

Kaufman’s paper was accorded an unusual honor, earning for its author a “second prize” though there was no first prize, from a prize fund donated by David Parks Fackler. The paper was discussed by Robert Henderson (Equitable Society) and James B. Gibb (Penn Mutual). □

SIGHTINGS

Dennis Harms spotted the following in a post-Olympics editorial in The Houston Post:

“Carl Lewis is no favorite of mine. . . . He is too calculating for me, too absorbed in his own ambitions. He takes as much as possible and, as he demonstrated in the long-jump final, gives as little as possible in return. Rooting for Carl Lewis is like cheering for an actuary.”

Thomas N. Taylor created his own sighting — indeed a “sighting” citing — in the Greensboro News and Record. He sent a letter to a columnist that included:

“So little is ever said about actuaries that the Society of Actuaries asks its members to send in ‘sightings’ of the word ‘actuary’ in print.”

Lisa Ryder excitedly spied a sailboat named “Atacuari” on Lake Ontario. She thought perhaps its owner was “an actuary with a mind for convoluting his profession to find a unique name for his boat.” However, on inquiry she was told that the “Atacuari” is a river in South America. (Sounds like grist for the Trivial Pursuit mill.)

Charles A. Peirce found a redundant reference to “gifted actuaries” in the New York Times.

Linden N. Cole and Raymond D. Berry both sent us a piece from the Wall Street Journal, where comedian and former accountant Bob Newhart laments the lack of a television program about the accounting profession. He says,

“accountants are considered so dull that even ‘Space Actuary’ . . . would have a better chance of making it on TV.”

Jarvis Farley, FCAS, saw the following in “Sweet and Low”, an Emma Lathen novel:

“Qualifying as an actuary does not exempt anyone from the human condition”.

Follow up to Editorial Comment in June Issue

My question of whether people read this column resulted in responses from Susan Silverman, Stephen C. Frechtling, Susan Parry Whelchel, Michael Mudry, and James B. Germain. Their notes were all positive, supportive, and complimentary — indeed, I’m almost embarrassed to have asked the question! Jim Germain put it particularly well:

“The more bizarre the items, the better. As to ‘actuaries in proper context’, that’s boring, whether in person or in print.”

Thanks for your responses.

D.A.P.