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Overlap Theory

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The respective values of $\overset{o}{e}_{65}$ are 17 and 20 years, their 3-year difference being 15% of 20. Here $\infty\ {}_{m}q_{65} \cdot {}_{f}\overset{2}{65}$ equals. 0.575.

For a bit more realistic model, we can try a male density rising linearly, such as .020 + .001t, peaking at t = 20, and then declining linearly as .080 − .002t, to reach zero at t = 40. Female density: .010 + .0015t, peaking at t = 20 also (for simplicity), declining as .072 − .0016t, to zero at t = 45. Here T = 20, and the difference between the ${}_{T}q_{65}$'s is 0.6 − 0.5 = 0.1. The $\overset{o}{e}_{65}$'s work out (I hope!) to 17 1/3 and 20 1/6, a difference of 2.83 years, implying an average span of 23.3 years between the 10% of deaths that are "early" and "late". Here, $\infty\ {}_{m}q_{65} \cdot {}_{f}\overset{2}{65}$ is 0.578, I believe.

Statements that look absurd to us actuaries sometimes have at least a small core of actuarial respectability if we take the trouble to dig it out. Let's always try!, says Prof. Baillie.

Observations By Others

None of our other correspondents held out an olive branch. Prof. Andrews said:

> The hollow nature of the (overlap) argument is emphasized when one notes that in an entirely analogous way one could argue that even though only 15% of 60-year-old males retiring early live longer than the 65-year-old males retiring at normal retirement age, 100% of the early retirees are penalized through lower monthly payments. Quite clearly, if enough people buy such arguments, age-based actuarial tables are vulnerable to attack. It would be funny if it weren't so serious.

Mr. Case had worked out what figures corresponding to the 15% would apply on two annuity tables. Using the 1971 Individual Annuity Table, the total of unmatched deaths was 14.41% of the starting number at age 65; for the 1971 Group Annuity Table it was much higher, 19.7%. He emphasized the disparity in average ages of the unmatched deaths because of its risk classification implications—for the 14.41% case, it was 92.59 years for women, 72.27 for men.

Mr. Myers identified the theory's developer as Professor of Economics Barbara Bergmann, University of Maryland. She and a colleague published it in the Fall 1975 issue of *Civil Rights Digest;* "I thought", says Mr. Myers, "that I had demolished (it) in a paper (in the same magazine, Winter 1977 issue)". He considers the theory as erroneous an application of actuarial science as, say, that if the expectation of life at birth for a particular category is 64, then none of this category will survive to age 65 and receive Social Security benefits.

Says Mr. Reid: "Of course, the logic underlying (the theory) is quite stupefying . . . I know of no rational argument that will cause (its) advocates to reconsider since it is not the reasoning but the conclusion which they consider important." *E.J.M.*

Engineer and Actuary

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During the course of their work, the engineer and the actuary happened to meet. They found they had a lot in common. They talked about the calculus courses they had had in college, compared their training in regulatory law, and noted the differences and similarities in their other academic courses. They were amused to note that, although their academic training was important, both now used the insights gained from ten years of practical problem-solving for clients to guide them to the best solutions for their clients.

The actuary presented his findings in a report to the City Council. The Council adopted a plan that eventually resulted in a stronger self-insurance fund and a savings of $20,000 per year.

Moral: The actuary, like the engineer, can increase your security, and often save you money.

AN ACTUARIAL GUIDE TO JAI-ALAI

by David M. Lipkin

(Second of two articles. The first) was in our November 1983 issue)

This article will first examine the results which would be expected if all teams had equal ability, and then contrast these expected results with actual experience.

Expected Results

In 1982, Carl Anderson, an actuarial student, wrote an APL program to simulate jai-alai. Each team's skill level can be input to the program, but, for these Monte Carlo tests, equal skill levels were assumed. The percentages below came from a sample of 5,000 simulated games:

Team	*Winning Percentage*
1	16.78%
2	16.92
3	14.28
4	12.54
5	10.38
6	9.32
7	8.82
8	10.96
Standard deviation	2.99%

This pattern is similar to what might be expected, as the low-numbered teams have a large advantage over the others. Team 8's is a special case described in the first article.

Actual Results

This next table was compiled from the programs sold at performances.

	Winning Percentages Hartford		Tampa
	1982	*1983*	*1983*
1	13.64%	14.56%	14.00%
2	16.78	14.66	13.77
3	14.12	12.82	12.47
4	11.54	12.58	12.04
5	11.99	11.78	12.22
6	10.71	11.22	11.05
7	9.47	10.27	11.73
8	11.75	12.11	12.72
Number of games	2,903	2,122	1,620
Standard deviation	2.13%	1.43%	.92%

How can we reconcile these actual results with the expected? Upon preliminary comparison, it seems that:

1. The difference in actual results between teams one and two in Hartford's 1982 season is surprisingly large.
2. The data for these samples follow the general pattern of the expected results.

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Actuarial Guide to Jai-Alai

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3. The deviation among the winning percentages is much smaller than expected, especially in Tampa. Let us study this further.

Handicapping

All men may be created equal; all jai-alai teams aren't.

Jai-alai management apparently believes that the betting public would rather see teams with more equal chances of winning than would be dictated by applying the rules of probability to the game's scoring mechanism. For example, a star player in post position 1 would be a prohibitive betting favorite. Since management's profit is tied to betting volume, they apparently believe that evenly-matched teams stimulate betting. To accomplish this, the more skillful players are almost always assigned to the more difficult post positions (5, 6, and 7).

The lower standard deviation for Tampa than for Hartford may simply mean that Tampa's management is more proficient at handicapping than is Hartford's. This seems unlikely, as the handicapping is done by the "player manager", himself an experienced pelotari, or jai-alai veteran. It seems more likely that Tampa's handicapping advantage is, instead, caused by a wider range of skill level among its teams, which allows for more effective handicapping.

To test these conclusions in another way, it will be useful to examine one final set of statistics—the results of singles, doubles and triples games.

Singles, Doubles, and Triples

To summarize the conclusion on handicapping, it appears that the deviation among the post positions' winning percentages is inversely proportional to the teams' range of skill. A wide range of skill, as apparently exists in Tampa, allows more effective handicapping and smoother results.

As was described in the previous article, different games throughout the evening feature teams of either one, two, or three players. In Hartford, a typical 13-game program consists of five singles matches, one triples match, and seven doubles matches.

Now, suppose that the Hartford fronton has a very talented player on its roster. During the singles matches, this player's talent would be expected to predominate, but in doubles matches his partner will probably be less talented than he, perhaps creating a mediocre team. In triples competition, this player will usually not have a great influence on his team's performance. Apparently, the more players on a team, the more likely that the teams will have similar skill levels.

If this is true, then the handicapping conclusion can be tested by comparing the deviations in singles, doubles, and triples games. The singles games, featuring a wide range of team skills, should be more effectively handicapped—their results should be smoother than the doubles and triples matches.

These statistics are for a portion of Hartford's 1983 season:

	Singles	*Doubles*	*Triples*	*All Games*
1	14.25%	14.49%	16.39%	14.56%
2	14.00	15.80	10.38	14.66
3	13.37	11.68	17.49	12.82
4	13.13	12.38	11.48	12.58
5	10.25	12.64	13.11	11.78
6	11.75	10.89	10.93	11.22
7	10.50	10.18	9.84	10.27
8	12.75	11.94	10.38	12.11
Number of games	800	1,139	183	2,122
Standard deviation	1.42%	1.73%	2.74%	1.43%

These results bear out the hypothesis. Further testing would be advisable, however, before emptying one's piggy-bank. The sample of triples games, for example, is unreliably small.

Anyone considering betting on jai-alai would be well advised to purchase a program, listing the number of games during the season played by each player, along with his numbers of first, second, and third-place finishes. Combine with your knowledge of the characteristics of the game's post positions, and a large dose of luck. Mix well.

Finally, a challenge to our readers—can anyone mathematically analyze the advantages and disadvantages of the various post positions? This would replace the "Monte Carlo" portion of this study. The place to start is by asking, for each team, what that team's chance is of winning the game during the first round. (Only teams one and two could do this.) Then, what is that team's chance of surviving to the next round and winning the game in that round? There is probably enough work here to keep the actuarial student community busy for a long time.

SPRING EXAM SEMINARS

Georgia State University will again offer April seminars on Parts 2, 3, 4, 5, 6 and 7(EA-1). Information from Prof. Robert W. Batten at his Yearbook address.

University of Waterloo seminars, April 21st to May 6th, will cover Parts 4 (incl. EA-1), 5, 6, 8, and 10 (Can. & U.S., all options). Enquire from Prof. Frank G. Reynolds at the University, Dept. of Actuarial Science, Waterloo, Ont., N2L 3G1, (519) 885-1211.

JOHANSEN HEADS COPAFS

Robert J. Johansen has done honor to the Society by rising to the chairmanship of the Council of Professional Associations on Federal Statistics, a body on which he has been our representative for some years.

The Council was formed in 1980 by twelve statistical associations to seek improvement in the quality, availability and usefulness of statistics gathered, analyzed and disseminated by Federal statistical agencies. COPAFS' member associations include more than 100,000 professionals.

COPAFS informs its member associations on aspects of U.S. statistical policy and programs, and advises decision-makers in the executive and legislative branches of its members' views. In these missions it has been notably effective.

Society members concerned with government statistics would do well to make use of COPAFS and the related Committee on Government Statistics. This may be done through Mr. Johansen or through Philip F. Finnegan (chairman of the Government Statistics Committee), whose addresses are in our Yearbook. *E.J.M.*

A TREAT FOR FAMILY HISTORY BUFFS

by Dale B. Brimley

When arriving at the Hotel Utah for our Salt Lake City meeting (May 3-4), actuaries should realize that less than one block away is the most extensive genealogical library in the world.

The Genealogical Department Library at 50 East North Temple Street grants free access to its facilities, and is open from 7:30 a.m. to 10 p.m. on the day before and days of our meeting. Group tours are offered as well as free classes, assistance in how to use the Library and its collections, and pedigree charts.