TFA 26 (1958-1960) 69-114

SELECTION OF RISKS

AMERICAN VIEWPOINT AND PRACTICE

by

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[Submitted to the Faculty on 19th January 1959. A synopsis of the paper will be found on page 91.]

One of the subjects discussed at the Fifteenth International Congress of Actuaries was *The Classification of Risks for Individual Life Insurance*. Thirteen papers from seven countries were submitted, indicating that the subject is of considerable interest and importance. The different opinions expressed in the papers were perhaps more evident in the discussion, and to one reader at least it seemed that there were some misunderstandings as to underwriting practice in Canada and the United States. This paper attempts to set forth the underwriting philosophy and practice of the life insurance companies doing business in these two countries.

UNDERWRITING AS AN EXECUTIVE FUNCTION

In 1931 Franklin B. Mead, an American actuary, wrote a paper entitled " Underwriting, A Major Executive Function " (*Proceedings, Home Office Life Underwriters Association*, Vol. II, page 5). The notion that in a life insurance company the underwriter should occupy an executive position was at that time somewhat novel. Mr. Mead pointed out that the area in which the life insurance companies had not done too well was that of underwriting, and that profitable mortality experience was essential to the success of a life insurance company. The idea that the underwriter exercises a major executive function may still be a novel one in other than Canadian and American practice, and even in these countries the underwriter is not always regarded as an executive. The underwriter in the fire and casualty branches of the insurance business has always been an important executive as is indicated by the following description from a British insurance publication :

> " In London, the underwriter is one of the chief executives of the insurance company or group. He is a man highly skilled and

> well paid. He has a comprehensive knowledge of the business and its intricacies. He is a man of good judgment, and of unimpeachable integrity. He is able to make rapid decisions. He has a broad knowledge of international affairs, and a personal awareness of conditions in many countries. He has a sixth sense that enables him to appraise situations not only as they are today, but as they probably will be in one, two, three or even more years to come."

The effects of unsound underwriting in the life insurance business may not be so immediately apparent as in the fire and casualty business, but sooner or later they will come to light.

Perhaps the importance of sound underwriting and of the underwriter as a major executive is greater in American practice because the American companies do not have the cushion in interest earnings that the British companies do. In a recent number of *The Economist* (July 12, 1958) in a discussion of British insurance there is the following comment:

> " Declining mortality rates and economies in management have helped to swell life office profits. But it is interest earnings that have largely determined bonuses."

The article goes on to say:

> " The improving trend of mortality is unlikely to be reversed. But the element in endowment assurance premiums to cover death risks is now so small that if early claims were confined to accidents the additional mortality profit would not be significant."

Such a comment about the relative unimportance of the profits from mortality could not be made about American companies even in the year 1958 when the interest rate earned is well above the levels being earned ten or fifteen years ago.

GENERAL CONSIDERATONS

Mortality, of course, is not static, and while the experience of recent years has provided life insurance offices with more profit than might reasonably have been anticipated from the initial underwriting, the sounder the initial underwriting the better have been the results. One function of underwriting is to combat anti-selection, and an

improving mortality does not relieve the underwriter of his problem ; it merely shifts the emphasis to require improvement in methods. Fundamentally the underwriter is a risk-taker and he must find the most efficient and least costly means of properly selecting the risks that are placed before him. Perhaps the risk-taking aspect is not sufficiently emphasised in life insurance : nothing is easier and less satisfactory for all concerned than refusing to consider a risk on any terms.

Mr. Springbett (*T.F.A.* 19, page 260) made the following statement :

> " It is the duty of offices to provide life insurance for as wide a field as possible on terms which are equitable for all and this field should only be limited by the difficulty of assessing the extra premium required."

In *T.S.A.* II, page 87, in a discussion on Underwriting, Mr. Pearce Shepherd stated :

> " There are three principal steps in the underwriting of sub-standard insurance—first, to determine price ranges in terms of dollars and cents for the insurance we want to offer ; second, to label each risk for assignment to its proper price class ; third, to check to see that the price charged for each class, and for each impairment, is fair and adequate. The various price classes must be of an arbitrary nature and do not necessarily bear any relationship to our current standard mortality which is varying all the time. There is no particular need to change price ranges very often, but we must change our labels from time to time as evidence indicates that certain impairments can be treated more liberally."

Mr. Springbett has stated the end of underwriting and Mr. Shepherd the means. The means outlined by Mr. Shepherd are strictly practical. This does not involve a discussion of the incidence of mortality which while of perhaps great theoretical interest is of practical value in day-to-day underwriting only in so far as it can be translated into appropriate extra premiums.

By and large the standard and substandard classifications have to be broad and simple, not complicated by variations in premiums or reserves because of the incidence of mortality. The statutory minimum cash values required in American practice impose a

practical limitation on multiplicity of variations in classification following variations in the incidence of mortality. Further, as can be learned from reading the discussion of the results of the " Medical Impairment Study—1951 " (*T.S.A.* VI, p. 287 *et seq.*), the incidence of extra mortality is not by any means as clearly established in an experience as might be desired in theory.

In practice, therefore, the underwriter has to find methods which are both simple to follow and economical and which will result in the risks being allotted without too much trouble to the classifications which have been pre-selected. Classification of risks into broadly homogeneous groups (the second point made by Mr. Shepherd) is the main business of underwriting.

In this process the underwriter must assess the whole man and decide from the information on the papers (application, medical examination, etc.) what items are likely to add an extra hazard to the life. In actuarial literature there are many discussions concerned with the problems of extra risks and with the problems of substandard insurance. Actually the underwriting process of classification applies to all risks, standard and substandard alike, and even the highest substandard class is merely a matter of degree of risk. The composition of the substandard classes, the number of such classes and the expected mortality range that each class will cover is a matter for the individual company to decide. The minimum acceptable degree of impairment is also a matter for the individual company. Most American companies today will consider applicants subject to a mortality of five or six times the normal as an upper limit. Between this limit and the limit of standard acceptance the number of substandard classes can be as few as three or as many as sixteen.

As already noted, the mechanics of underwriting should be simple and largely capable of being operated by trained laymen. On the North American continent the underwriting staffs of the life insurance companies are not composed only of medical directors and actuaries. They are chiefly composed of individuals trained in the science (and art) of classifying risks according to the prospects of longevity of these applicants for insurance. The " lay underwriters," as they are generally called, can and do handle the most intricate cases, sometimes without any consultation with a medical director. In a discussion of the Classification of Risks papers for the Fifteenth International Congress of Actuaries Mr. Pedoe referred to this underwriting as a "casual process " but the casual appearance overlays a considerable amount of organised work.

UNDERWRITING MANUAL AND THE NUMERICAL RATING SYSTEM

The primary tool of the underwriter is an underwriting manual. This is a classification of all impairments arranged either by body system or alphabetically and, in accordance with the Numerical Rating System in general use, the manual will allot to each of these impairments a debit value reflecting the expected extra mortality. Such a manual can be placed in the hands of laymen and used to underwrite applications. All manuals have a basic table showing the expected mortality by build and probably all will have the expected mortality according to blood pressure findings. Specimen build and blood pressure tables are shown in the Appendix, as is also a specimen page from a manual covering numerical ratings for heart murmurs.

The Numerical Rating System, judging by the comments made both in the past and recently, still seems to be words " teeming with hidden meaning " for most British actuaries even though one of the co-authors of the system is a distinguished Fellow of the Faculty of Actuaries (see Rogers and Hunter, *T.A.S.A.* XX, p. 273.) The system is not a method of assessing extra premiums ; it is merely a convenient method of classification aimed at producing consistency in action on lives with similar prospects of longevity.

The Numerical Rating System was originally described as follows (Rogers and Hunter *loc. cit.*) :

> " The underlying principle in the numerical method of medical selection rests on the assumption that the average risk accepted by a company has a value of 100 per cent, and that each one of the factors which make up a risk shall be expressed numerically in terms of 100 per cent, and that, by the summation of them or by some modification of their summation, the value of any risk shall be determined and expressed with relation to that standard. . . . Wherever there is clear evidence that two factors are inter-dependent so that their addition is not sufficient or is distinctly too large, allowance is made for that inter-dependence."

The method assumes that the final result is consistent with good judgment. An accumulation of credits, for example, is not allowed to nullify a substantial and important debit. The method is not suitable nor necessary for impairments involving hazards which are essentially temporary.

The effect of impairments upon longevity is generally measured in percentage departures from the normal. These, however, may or may not be translated into percentage extra classes depending on the classifications used by the individual company. The company in which the Numerical Rating System was first used was at that time and for some years subsequently using a rating up in age method for assessing extra hazards.

An underwriting manual can easily be applied to the majority of cases but the system is neither a substitute for individual judgment nor automatically applicable to all instances. The following case shows that individual judgment may have to be applied irrespective of the manual:

> This is a 50-year old applicant who passes a good medical examination. About six months prior to application he developed a slight awkwardness of right leg, foot and hand. He saw a doctor whose diagnosis was " destructive lesion, left cerebral hemisphere, type to be determined ". He subsequently went to two prominent clinics. The first clinic stated " the diagnosis of Parkinsonism may indeed be correct. However, it is quite possible and not uncommon for other disease processes to improve subjectively with certain drugs, and the fact remains that the electroencephalogram and reflex changes in the physical examination are most unusual findings in Parkinsonism. Thus new evidence cannot exclude the possibility of the tumour even though a degenerative process (Parkinsonism) is more strongly suggested."
>
> The second clinic suggested, " We have minimal findings suggesting the possibility of a left cerebral lesion ", but on review made the following statements:
>
> " 1. I do not think you have a brain tumour although only subsequent examinations will enable us to exclude this possibility with certainty.
>
> 2. The irregularities shown in the brain wave test could be due to a number of things. One possibility is that they are congenital and have always been present.
>
> 3. At the present time the findings do not suggest Parkinson's Disease."

There are three widely different opinions: (*a*) a brain tumour, (*b*) Parkinson's Disease and (*c*) a congenital deformity in the brain (unusual for this to appear at age 50). If (*a*) is correct, the applica-

tion should be declined; if (*b*) is correct, it might be accepted with a very heavy rating; if (*c*) is correct, the case is probably standard.

Such a case calls for the best judgment of the medical director and the underwriter. It could be finally classified in terms of the Numerical Rating System if the judgment were that the risk was properly acceptable in a percentage mortality class.

All of the ratings quoted in the manual do not follow the debit method using a percentage of the normal to express the expected mortality. There are impairments, mainly those arising from a medical history (say cancer) where the experience suggests a rating independent of age and a flat extra premium per thousand dollars may be charged for a limited number of years.

The underwriting manual has a statistical background, although not all ratings are derived from statistics. For some impairments there are no statistics and for others the statistics have to be modified in the light of current medical developments. In any event, the manual is an attempt to set up a reasonably accurate prognosis of the mortality to be expected and it provides for consistent action in like cases with, however, allowances for variations in the individual case. The manual is usually prepared through the combined efforts of the medical director, the actuary and the underwriter.

It is impossible to produce an underwriting manual without some information as to the mortality under a number of the more basic, more frequently occurring impairments such as overweight, heart murmurs, hypertension, etc. A rating chart for build, such as that given in the Appendix, is an essential for underwriting since all applicants can be classified by height, weight and age. The blood pressure table is included because hypertension is a common finding capable of numerical measurement. Some statistical investigation is necessary, therefore, if these tables are to be constructed.

UNDERWRITING PRACTICE

The underwriter is trying to classify risks as accurately and as consistently as possible. For the purposes of classification it is customary to review the risk in terms of the various factors affecting mortality, physical, occupational, etc., in light of the information furnished by the application and the medical examination. These should be as complete as possible but in practice there will be many instances where additional information is needed. The use of additional aids to underwriting is always desirable from a theoretical point of view because the more information available the better will

be the underwriting appraisal. On the other hand, additional requirements cause delays and additional expense, and also to quote Dr. Hewat and Mr. Penn (*T.F.A.* 22, p. 174):

> " It must be borne in mind that there are limits to the trouble to which a proposer for life assurance can be put."

Against the advantages and expense of the additional information has to be weighed the extra cost in terms of the possible extra mortality to be experienced. This problem was discussed by Mr. A. P. Morton in the *Proceedings of the Fifteenth International Congress of Actuaries*, Vol. II, p. 25.

Perhaps the most common form of additional information is a statement from the applicant's attending physician. Such statements are not called for routinely. For smaller amounts of insurance they will be obtained only if the medical history needs clarification or if in the underwriter's judgment the history does not seem altogether usual, e.g., a farm labourer gives a history of going for a check-up—and farm labourers do not usually have check-ups. For large amounts statements are obtained from the applicant's attending physician as a matter of routine, and as might be expected, similar statements are freely called for on non-medical applications to avoid having the applicant undergo an examination. The information from the attending physician is asked for by letter over the signature of the Company's medical director and the doctor is asked for answers to a definite set of questions.

Considerable use has been made of electrocardiograms and X-rays in connection with policies for large amounts where they may be called for routinely. These are not infallible guides to the selection of good risks, although these and other additional aids to selection have undoubtedly produced results as is shown by the following comment: *

> " The very favourable experience on policies for large amounts at ages 50 and over is believed to reflect the effects of very careful selection of older applicants by means of multiple medical examinations, electrocardiograms, X-rays of the chest, free use of physicians' statements, etc."

Historically the use of the special aids, particularly the electrocardiogram and X-ray, arose because of poor experience in their absence. These requirements were rarely called for prior to 1931

* Society of Actuaries 1954 Reports of Mortality and Morbidity Experience p. 25: Large amounts are defined as $50,000 and over.

but poor mortality results under policies for large amounts suggested to the underwriters, both medical and lay, that better underwriting information was needed on these large cases. The effect of this better information has been satisfactory, as stated above.

The electrocardiogram and X-ray, it should be remembered, are both mechanical records. A clear electrocardiogram and X-ray is no guarantee that any one insured will not die of a heart attack within a month. Over a large group of risks, however, the effect on the mortality experience will be favourable.

The electrocardiogram and X-ray are not the only special aids in use but these are used routinely according to amount applied for (see Mr. Morton's paper previously referred to) while other special tests—glucose tolerance, liver function—are likely to be used only where special circumstances seem to require them. The influence of the amount of insurance applied for cannot be overemphasised. When the amount at risk is large the underwriter is surely entitled to as much information about the physical side of the risk as can possibly be obtained within reason. Actually, with complete information classification by degree of extra hazard for most physical impairments is relatively simple and reasonably accurate because of the extent of the statistical information now available on many impairments.

Extra mortality arising from hazardous occupations seems to be of less importance. This is due to the improvement in industrial medicine and industrial safety, both of which have contributed in a great degree to a material reduction in occupational mortality. Perhaps even more important has been the contribution of better public health services, better living conditions because of higher wages, and better medical care. There would seem to be, outside of a few occupations with definite accident hazards (e.g., structural steel workers), a greater mortality difference by social classes than by occupational classes. The unskilled labourer may still be a worse than standard risk more because of himself and his social environment than because of any occupational hazard.

One accepted feature of Canadian and American underwriting practice which should be mentioned is the use of an inspection report. This is an objective report made generally by an organisation not connected with the life insurance business. It covers the occupation, financial worth and income of the applicant, and gives the underwriter also a picture of his habits and social behaviour and both business and personal reputation. It may also cover the purpose of the insurance and may comment on the proposed beneficiary if other

than the insured's family. The report covers many of the factors that, unlike physical impairments, are not capable of exact measurement. These are some of the intangibles that the underwriter has to look for if he is successfully to avoid anti-selection. Financial underwriting in particular is always important. The total amount of insurance on any individual should bear an appropriate and reasonable relation to his worth and income. Overinsurance can be as costly as any physical impairment in terms of mortality experience and cannot, as in the case of a physical impairment, be compensated for by an extra premium. Where large amounts of insurance are involved the inspection report may be more important than accurate classification by physical impairment or by occupation. The inspection report is subject to the same criteria as any other aid to underwriting—the report costs money and the cost, therefore, should be measured in relation to the mortality savings resulting from the use of the report.

At this point the actuary, who has been observing the trend of mortality rates, might well remark that the underwriter seems to be going to a great deal of trouble to select lives from a group where the basic mortality is low enough to be practically nonexistent (except for accidents) at the younger ages. To this comment one answer might be that the low mortality is the result of selection and that if the rules are changed so will the experience be changed. There is no objection to this being done as a matter of conscious liberality.

Another answer is that the underwriter is recognising the low mortality being experienced by calling for fewer additional requirements and extending the use of non-medical applications to higher ages and for larger amounts.

NON-MEDICAL

The original form of underwriting was non-medical: the applicant completed a simple declaration and made a personal appearance before the Board of Directors. Medical examinations were a later refinement. Now the wheel has gone full circle for today non-medical underwriting plays an important part in the operation of a life insurance company. In many offices by far the larger proportion of the applications are acted upon without a medical examination. The low level of death rates already mentioned has been one factor in the use of non-medical; the other factor has been the increase in expense not only in the actual cost of the medical examinations but also in the increased cost of handling and underwriting these exam-

inations. The figures in Table I are from the 1956 Mortality and Morbidity Report of the Society of Actuaries.

TABLE I

Trend of Experience on Medical Issues

First Five Policy Years

Ages at Issue	Experience for Period between Anniversaries in Indicated Years			
	1939–1943	1943–1947	1947–1951	1951–1955
	Mortality Rate per 1,000 (Based on Amounts of Insurance)			
10–14	0·646	0·643	0·517	0·553
15–19	1·039	0·942	0·870	0·941
20–24	0·980	0·853	0·797	0·760
25–29	0·998	0·961	0·810	0·723
30–34	1·290	1·162	0·975	0·931
35–39	1·910	1·672	1·566	1·376
40–44	2·987	2·615	2·437	2·203
45–49	4·621	4·044	4·096	3·660
50–54	7·787	6·053	5·607	5·519
55–59	10·819	9·211	8·776	7·914
60–64	14·651	12·121	12·804	10·451
65 and over	20·834	18·679	24·290	16·386

The mortality on Non-Medical business for the 1951-1955 period is approximately 108% of that on medically examined business.

The rates of mortality at ages under 30 are very low. The expense of a medical examination, therefore, can well be applied as an offset to any adverse mortality resulting from the absence of an examination. And a further argument for non-medical is that examinations are not likely to uncover many impairments in young applicants. The non-medical underwriting rules have therefore to be a function of the age of the applicant and the amount of the application.

Non-medical underwriting for relatively large amounts is not new in British practice and the rules as to age limits are in general more liberal than in American practice. In European countries apparently non-medical practice covers even a wider area. Many of the insurers in these countries even issue substandard insurance non-medically for substantial amounts. In America a limited amount of substandard business is being written non-medically with satisfactory results. For such business medical histories are confirmed and where necessary clarified by statements from attending physicians.

The upper age limit for non-medical insurance seems to vary a great deal between countries. As the rate of mortality increases

with age the adverse fluctuations of the rate that can be absorbed by the savings in expense decrease rapidly. Further analysis shows that the percentage of rated cases increases with age and the probability of the medical examination uncovering an impairment increases similarly. The chance of the non-medical experience being adverse is therefore increased. American non-medical experience has been poor at issue ages over 40 and definitely adverse at issue ages over age 45. Non-medical rules, therefore, are generous at the younger ages and are scaled down rapidly in amount as the upper age—generally 40—is reached. Even without any adverse experience the savings in expense at age 50, for example, provide for only a small increase in the mortality rate. European practice is generous even at the higher ages and the experience is presumably satisfactory. In British practice the prevalence of endowment insurance business might justify more liberal rules.

The problem of how far non-medical underwriting should be extended either as to amounts, ages or substandard risks, is ever present because of lower mortality and increasing expenses. All the rules of non-medical insurance should, therefore, be subject to frequent re-examination.

The operation of the Numerical Rating System as a means to consistent and accurate classification might well be queried in connection with non-medical business. Actually the classification is carried through in the same manner with the limited information available.

Non-medical rules have been greatly liberalised both in American and British practice for policies effected in connection with pension schemes. The American experience on pension trust business has so far been consistently favourable. In this business, apart from any selection which might be exercised by the insurer, there are two outside controls operating which may contribute to the favourable results. In the first place, the insured lives have to be actively at work thereby avoiding the issue of policies on any lives with serious impairments. In the second place, the Treasury regulations as to the acceptability of the trust for tax exemption eliminate to a great extent the anti-selection arising from having too large amounts of insurance on carefully chosen lives.

SUBSTANDARD CLASSES

It has already been mentioned that the number and range of the sub-standard classes (Mr. Shepherd's first point) is a matter for the

individual company to decide. The following is an example of how the classes may be arranged :

TABLE II

Class	Numerical Rating Range*
Standard	–125
A	130–155
B	160–195
C	200–250
D	255–325
E	330–450
F	455–525

* Numerical Ratings are most often given by 5 point intervals.

In this example there are six substandard classes. A company may elect more or fewer classes and will vary the ranges accordingly. Most substandard extras are based on extra percentage mortality tables. These are used not because they actually reproduce the incidence of mortality on all impairments—they do not—but because they are sufficiently accurate and work well in practice.

Obviously in such a class operation as is outlined above the bulk of the business will fall within the standard class and the amount of business in the substandard classes will decrease with the increase in the expected mortality so that the exposures in Class F, for example, are not likely to be great for any one company.

There is no absolute or accepted rule about the figures quoted and the standard class can, if the company so elects, cover ratings up to 155. There are many arguments for broadening the standard class and there are those who suggest that since substandard business is but a small part of the total business it is hardly worth while to be so precise about the classification. Equity, however, would seem to require that only like risks be included with like. Competition may well take care of any tendency to overrate.

It is perhaps of some interest to consider the effect of including, say, the first substandard class in the standard group. There have been several discussions of this subject. One company estimated in 1956 that had they accepted all risks rated in the first two classifications (135%–150%) at standard rates the overall standard mortality would have been increased by one percentage point. If all insurable risks had been accepted standard the overall mortality would have been increased by 7·4 percentage points.

Another company estimated that the dividends on Ordinary Life

would have been reduced as follows had the first substandard group been issued at standard rates:

Age	*Reduction per* $1000
20	6 cents
35	$8\frac{1}{2}$ cents
50	15 cents

In the keen net cost competition characteristic of the North American market such apparently trivial items are not to be ignored. The analyses do not take into account the fact that the results were derived from a certain selective process and that future experience might be much worse for one company if the process were changed unless all companies decided to be equally liberal—a consistency which is not likely to occur.

The standard class has been broadened by the inclusion of certain occupations where there is only a slight extra mortality involved. This liberality has not generally been extended to physical impairments. Occupational extra mortality has been steadily decreasing and consequently the absorption of the extra mortality in the standard group may be justified. The mortality by physical impairment, on the other hand, has not shown the same degree of improvement relative to the standard mortality.

The use of a broader standard group at the younger ages may be justified on the grounds that extra premiums based on percentage q_x mortality tables are very small at these ages (on endowment insurance the extra may be close to zero) and there seems to be little deferred mortality on substandard risks.

There have been suggestions that the present method of basing the substandard extra premiums on percentage q_x tables be replaced by extra premiums in terms of k extra deaths per thousand because of the low extra premiums under the present system. The substandard classes could then be, say, $3.00 per $1,000, $5.00 per $1,000, etc. This type of substandard class might not be suitable at the older ages where the percentage q_x extra even for the first substandard class might be covering more than three extra deaths per $1,000. Obviously such a classification produces a broad standard class at the younger ages at least. Unless, however, competing companies were following the same pattern the company using the k deaths per 1,000 system might well attract an undue number of borderline risks.

The papers for the Fifteenth International Congress of Actuaries on the Classification of Risks showed that in many countries there

is a standardisation of the treatment of extra risks either by reinsurance pools or by general agreement among the competing offices. Any such arrangement in the United States would bring the Department of Justice about our heads for violation of the anti-trust laws, apart from any question of whether the practice of standardising substandard extras would be doing the best job for the insuring public. Admittedly there is bound to be a certain degree of standardisation if the ratings are based upon the same statistical material. On the other hand, the experience of the individual offices reflects the underwriting skill available to these offices and can well make a considerable difference in the net cost of the product.

MORTALITY INVESTIGATIONS

Mr. Shepherd's third point was that we should check to see that the price charged for each class and for each impairment is fair and adequate. The first test then is to take off the experience of the various substandard classes and compare the experience with the extra premiums charged over a reasonable exposure. This is the simplest measure, although even if the comparison is satisfactory it may not mean that equity is being preserved between various impairments. It might happen that the company is underrating overweights and overrating blood pressures.

A satisfactory overall result can be misleading because it may encourage the company to continue underrating a specific impairment, an underwriting weakness that will undoubtedly be exploited to the company's detriment. Further, an improving general mortality can make any substandard group look well and in analysing the results the actuary must take into account the secular trend of mortality.

The test of the premiums by impairment requires a more detailed investigation and obviously not all offices have a large enough exposure on any impairment to make an investigation of any value. For this reason, if for no other, the Joint Committee investigations made by the Society of Actuaries and the Association of Life Insurance Medical Directors are important despite their many shortcomings. The two principal defects of these general investigations are the possible change in future mortality because of new medical treatments and the relatively short period of exposure which does not allow for the full effect of the extra mortality. The answer to the first is that in translating the statistics for practical

use the underwriter must take into account improvements in medical techniques. The answer to the second is that as a guide to future mortality half a loaf is better than no bread, and that even an exposure over a short period of years is better than no investigation at all. Further, the general improvement in mortality may well make any long exposure of little statistical value. Perhaps the only criticism of the Joint Committee studies that carries weight at the present time is their great expense, but on the other hand this expense is relative and the value of the statistics should well justify the cost.

If as a result of the test of premiums by substandard class there is satisfactory evidence that the extra premiums are perhaps more than adequate for the extra mortality being experienced, the actuary has two choices. He can reduce the extra premiums without changing the mortality ranges of the existing classes or he can broaden these classes so that the expected extra mortality will more nearly equal the extra premiums being charged. Both courses have their supporters.

The periodic investigations into the mortality of individual impairments call for another kind of check. Here the actuary can determine whether the underwriting rules, the Numerical Ratings in fact, are satisfactory. For some impairments the results will indicate more favourable treatment, for others the ratings will have to be increased.

The experience on ulcer histories shows how important it is to make periodical investigations of the same impairment where it is of sufficient underwriting importance. The Impairment Study 1936 on Gastric and Duodenal Ulcers showed relatively favourable mortality on applicants with these histories. As a result the ratings for ulcer histories were lowered in practically all companies. The Impairment Study 1951 provided a somewhat rude awakening, commented on as follows :

> " The relatively favorable experience found in the Impairment Study 1936 and unduly overoptimistic evaluations of recent advances in the surgical treatment of ulcers may have led to some unduly liberal underwriting of this impairment in recent years, which has apparently been reflected in the higher mortality ratios found in the present study." (E. A. Lew, *T.A.S.A.*, VI, 299.)

> " *Ulcer*-Results seem to confirm feeling of many that underwriting of this condition has slipped gradually into overliberal

treatment. Hemorrhage and operation are unfavorable factors. Surgery alone may never be 100% effective in these ulcer cases because the individual's personality or "psyche" remains unchanged. Study shows that deaths from coronary artery disease and cerebral hemorrhage were above normal where there was an ulcer history." (Dr. William Bolt, *T.A.S.A.*, VI, 308.)

The Study itself makes the following comment:

"There has unquestionably been real improvement in the prognosis for persons with peptic ulcer. A comparison of the actual death rates in the ulcer classifications in the present and earlier studies shows that the death rates in the present study have been lower than in the earlier studies. The decline in mortality among persons with peptic ulcers has not, however, kept pace with that of unimpaired risks, and this is reflected in some increase in the relative mortality found in the present study among persons with peptic ulcers."

As a result of these findings considerable changes have been made in ratings for ulcer histories and the cases (following the analysis in the 1951 Study) are subdivided by site of ulcer, history of haemorrhage, surgical operation, etc. These subdivisions, it is hoped,will be the key to more accurate underwriting of a very common impairment.

One of the most common impairments—hypertension—provides another example of the advantages of frequent investigation of the mortality from these impairments. This paper is written before the results of the latest Blood Pressure Study are available. If it follows the pattern of previous studies, the underwriters will find that their current ratings are not adequate for the extra mortality experienced. The Blood Pressure ratings in the Table in the Appendix are much more severe than those of twenty years ago. Perhaps we have still to learn how to underwrite hypertensives.

The experience on the two impairments cited has shown the need for continued investigation, that proper underwriting caution demands a periodical check on the underwriting operation. There are other impairments where the periodical checks have resulted in further reductions in the extra rating. These periodic checks seem to be necessary if the underwriting operation is to be kept in proper balance and the insurer is to continue to do a satisfactory job in extending insurance coverage.

The objection may be raised that investigations of admittedly short duration cannot be expected to demonstrate any deferred mortality. There is some evidence that, over all, the curve of

substandard mortality tends to approach the standard curve at the later durations, which would suggest that there is little measurable deferred mortality. Then the death rates improve with succeeding generations so that the current experience at the later durations is covered by the extra premiums being charged. The division between standard and substandard lives at the later durations may be difficult to determine and the question of deferred extra mortality may be of little practical consequence.

Changes in ratings as a result of current mortality investigations are easily translated into underwriting rules by the Numerical Rating System—the debits are properly adjusted. These debits are based on the mortality ratios derived from the new study which will have a current standard mortality table as a measure. The relation of the impairment debits to expected mortality of the standard class is thereby maintained.

The application of the results of these investigations to underwriting practice is not, of course, a matter of merely translating the ratios into the appropriate numerical debits. Apart altogether from any statistical weaknesses of the study, sometimes only partially corrected by the use of *Standard Deviations* and *Confidence Intervals*, there has to be considered information derived from current clinical medicine. It is here that the medical director can be of great value because of his knowledge of current medical practice. Some, at least, of the ratings will be modified because of possible future improvements in mortality as a result of new and improved medical techniques.

It has been suggested that the underwriter is trying to guess future mortality, that past statistics are not necessarily a reliable guide for the future, and that therefore there is not much point in making statistical investigations since they are out of date by the time they are published. The following comment on the 1951 Impairment Study may be a part answer :

> " Perhaps the most striking single feature of the findings of the 1951 Impairment Study is that the mortality ratios in most impairment classifications are reasonably close to those in the Medical Impairment Study 1929, the Impairment Study 1936 and the Impairment Study 1938, indicating that the underwriting of medical impairments has on the whole been commendably accurate." (E. A. Lew, *T.A.S.A.*, VI, p. 289.)

And at least the investigations show the actuary where he has been if not where he is going.

In addition to the tests and investigations already described, there are less extensive checks on underwriting that many companies make. One check is the analysis of early death claims (and in the United States all policies are incontestable after being in force for two years). Many underwriting lessons can be learned from reviewing early claims. Claims involving misrepresentation are a matter for the lawyer, but claims involving careless underwriting are a matter for the underwriter.

Another check is to compare the company's mortality with the Recent Issues Experience compiled by the Mortality Committee of the Society of Actuaries, thereby measuring the company's current mortality against that of a group of competitors. The effect of poor underwriting can persist for a long time and it is only by frequent testing that adverse trends can be discovered.

CURRENT PROBLEMS

Mortality is not static—the death rates of today cannot be projected indefinitely into the future. New ways of medicine lessen the effect of certain impairments on longevity. More accurate classification by subdivision enables the underwriter to do a better underwriting job on certain impairments. More knowledge extends the life insurance field of coverage. All these add up to new problems for the underwriter. This section will discuss some areas of special interest at the present time.

Female Lives. Female mortality is now so much lower than male mortality that a differentiation in premium rates by sex has become the practice of many companies. A recent study shows that female mortality is less than two-thirds of the male rates. The companies have been aware of this difference in mortality for some time. As a result there has been a tendency on the part of underwriters to give credits to female applicants. This might have the effect of including in the standard class female lives where the numerical rating might indicate that the risk belonged in the first or second substandard class. This is not completely satisfactory if the male and female mortality curves are significantly different and special premium rates for female lives would seem to be a better answer. Some companies are using a three-year rate-down for female lives as a reasonable approximation to a rate based upon a female mortality table. The former practical objections to special rates for female lives, lower average size policy, higher lapse rate, multiplicity of premium schedules seem to have been overcome by some companies.

There is still inadequate information as to substandard female mortality. It may be that impaired female lives are relatively worse than male lives when measured against basic mortality by sex. On the other hand, there is some evidence that hypertension in females may be treated more leniently (see Annie Mary Lyle, *T.S.A.*, VI, p. 247). Pregnancy is no longer considered a hazard, at least in the early months, if the application otherwise satisfies underwriting standard.

Heretofore most insurance studies have been of mixed lives. It is now recognised that the different female mortality can have a considerable influence upon the final results. The differentiation of the results by sex in mortality studies will, therefore, provide more information as to female mortality. It will also provide more accurate information as to male mortality which may be important in certain impairments. Current studies, including some of the impairments in the Impairment Study 1951, are separating the data by sex. The Build and Blood Pressure Study will publish results for both males and females. The annual mortality reports already give the data for male and female lives separately.

Blood Pressure. The underwriting of hypertension has always been difficult, perhaps because of a reluctance on the part of the clinician to recognise the mortality importance of even slight hypertension. The authors of the book referred to in the paper by Dr. Hewat and Mr. Penn seem to share this reluctance. A satisfactory clinical blood pressure can be, as the statistics have repeatedly shown, a substandard blood pressure from the underwriting viewpoint. Today the underwriting problem is more complicated because of the favourable effects on hypertensives of various drugs. There are many instances where the blood pressure has been reduced to the normal range and so maintained for three or four years. This does not give the underwriter any guide as to the future mortality of these lives, and even the clinicians will not make any guesses. Possibly another Blood Pressure Study based on lives who have been taking these drugs will be the only way to test the results. In the meantime there is the problem of applicants being possibly prepared for the medical examination by taking one of these drugs. Perhaps the medical examination questions should be more specific as to treatment for blood pressure.

Experimental Underwriting. It should be possible to insure more lives as the general mortality improves and as the knowledge and treatment of certain impairments improve. Experimental underwriting, therefore, may well form a part of any underwriting depart-

ment. Here the clinician and the underwriter and the actuary meet to fix a proper price and proper underwriting standards. As the experiment grows the underwriter acquires more accurate knowledge. The underwriting of diabetics, for example, was originally experimental—now practically all controlled diabetics are acceptable for insurance by nearly all companies at a proper rate. Today applicants with a history of coronary thrombosis who have returned to normal living are being accepted for insurance subject to a searching examination and at a fairly high extra premium. In this way the underwriters are further reducing the list of uninsurables.

There is no limit to the extension of experimental underwriting if the applicants are willing to pay the price. The premium rate has to be acceptable otherwise the careful and expensive work of the underwriter is wasted and the " not-taken " rate does increase with the increase in substandard classification. From the company's side, the practical rate is one where there is a reasonable chance of at least breaking even and where the mortality is not necessarily projected beyond a survival period of say five years.

Experimental underwriting does not have to involve major impairments. For example, it is now established practice to consider applicants recovered from an operation immediately on their return to work rather than postpone the application for several months. Some insurers adopted the idea that a single small extra (e.g. $\frac{1}{2}$ of 1%) would cover any additional mortality in the first few months following an operation. It is now only the most serious cases (cancer for example) that are postponed beyond the time that the applicant has resumed his normal way of life.

GENERAL

Underwriting is not done in a vacuum. The life insurance company should have some idea of the mortality it is aiming at and of how such a result is to be obtained. It is most important that the agency force of the company be acquainted with the objectives of the company. The underwriting must be satisfactory to the field and must be competitive within the limits set down by management. The method of marketing life insurance in Canada and the United States is bound to affect underwriting practice in the home office. The field and the home office underwriters must each understand the problems of the other.

Many companies go to great lengths to acquaint the agency force

with their underwriting aims and will furnish to the field guides showing the probable rating for various impairments. The success of non-medical underwriting has been mentioned. For this to be successful, a well trained field force is essential and co-operation between the underwriter and the men in the field is essential if satisfactory results are to be achieved.

Basic, however, in any underwriting are the problems of preventing anti-selection and of obtaining a satisfactory mortality. Selection is more than a mere matter of mechanical classification according to answers written on a piece of paper. It is a process calling for knowledge and skill and the greater the knowledge the greater the skill and the greater the service to the insuring public.

Hardly any paper today is complete without a reference to electronics. There have been suggestions that underwriting might well be done by the IBM 705-III (*J.I.A.*, Vol. 84, p. 57 : Remarks by Mr. B. T. Ramm). It is not for an underwriter to scoff at this fascinating prospect. Today it would take longer and cost more to punch the details of each application for the machine than it does to have fallible human beings act on application papers. Tomorrow may be another story when the machine will have developed the sixth sense essential for good underwriting. This is the sense which tells the underwriter that although the case is clear in most respects as far as answers to the various questions in the application and in the medical examination are concerned, there is still something missing, something that does not make sense and needs further investigation.

In conclusion I would like to thank Mr. J. B. Maclean and Mr. A. P. Morton for their help in reviewing this paper and in making many suggestions which have improved its content.

Mortality Ratings for Build

Men

Height	Underweight								Stan-dard	Overweight															Height
5–0	77	84	90	97	103	110	116	123	129	135	142	148	155	161	168	174	181	187	194	200	206	213	219	226	5–0
1	79	85	92	98	105	111	118	124	131	138	144	151	157	164	170	177	183	190	197	203	210	216	223	229	1
2	80	86	93	100	106	113	120	126	133	140	146	153	160	166	173	180	186	193	200	206	215	219	226	233	2
3	82	88	95	102	109	116	122	129	136	143	150	156	163	170	177	184	190	197	204	211	218	224	231	238	3
4	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182	189	196	203	210	217	224	231	238	245	4
5	86	94	101	108	115	122	130	137	144	151	158	166	173	180	187	194	202	209	216	223	230	238	245	252	5
6	89	96	104	111	118	126	133	141	148	155	163	170	178	185	192	200	207	215	222	229	237	244	252	259	6
7	91	99	106	114	122	129	137	144	152	160	167	175	182	190	198	205	213	220	228	236	243	251	258	266	7
8	94	102	110	118	126	133	141	149	157	165	173	181	188	196	204	212	220	228	236	243	251	259	267	275	8
9	97	105	113	122	130	138	146	154	162	170	178	186	194	203	211	219	227	235	243	251	259	267	275	284	9
10	100	109	117	125	134	142	150	159	167	175	184	192	200	209	217	225	234	242	251	259	267	276	284	292	10
11	103	112	120	129	138	146	155	163	172	181	189	198	206	215	224	232	241	249	258	267	275	284	292	301	11
6–0	107	116	125	134	142	151	160	169	178	187	196	205	214	223	231	240	249	258	267	276	285	294	303	312	6–0
1	110	120	129	138	147	156	166	175	184	193	202	212	221	230	239	248	258	267	276	285	294	304	313	322	1
2	115	124	134	143	153	162	172	181	191	201	210	220	229	239	248	258	267	277	287	296	306	315	325	334	2
3	118	128	138	148	158	167	177	187	197	207	217	227	236	246	256	266	276	286	296	305	315	325	335	345	3
4	122	132	142	154	162	173	183	193	203	213	223	233	244	254	264	274	284	294	305	315	325	335	345	355	4
Pctg.	−40	−35	−30	−25	−20	−15	−10	−5	Std.	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70	+75	Pctg.
Age	Mortality Ratings—Average Family History									Mortality Ratings—Average Family History															
15	145	135	125	115	110	105	100	95	95	95	100	105	110	120	130	140	150	160	170	180	190	205	215	230	5–0
20	145	135	125	115	110	105	100	95	95	95	100	105	110	120	130	140	150	160	170	180	190	205	215	230	1
25	140	130	120	115	110	105	100	95	95	95	100	105	110	120	130	140	150	160	175	185	195	210	220	235	2
30	130	125	120	115	110	105	100	95	95	95	100	105	110	120	130	140	150	165	175	185	195	210	220	235	3
35	125	120	115	110	105	100	100	95	95	95	100	105	115	125	135	145	155	170	180	190	200	215	225	240	4
40	120	115	110	105	100	100	100	95	95	95	100	105	115	125	135	145	155	170	180	190	200	215	225	240	5
45	115	110	105	100	100	100	100	95	95	95	100	105	115	125	135	145	155	170	180	195	205	220	230	245	6
50	115	110	105	100	100	100	100	95	95	95	100	105	115	125	135	145	155	170	180	195	205	220	230	245	7
55	110	105	100	100	100	100	100	95	95	95	100	105	115	125	135	145	155	170	180	195	205	220	230	245	8
60	110	105	100	100	100	100	100	95	95	95	100	105	115	125	135	145	155	175	185	200	210	225	235	250	9
												110	120	130	140	150	160	180	190	205	215	230	240	255	10
												110	120	130	140	150	160	180	190	205	215	235	245	260	11
												110	120	135	145	155	165	185	195	210	220	240	250	265	6–0
												110	120	135	145	155	165	185	195	215	225	245	255	270	1
												110	125	140	150	160	170	190	200	220	230	250	260	275	2
												110	125	140	150	160	170	190	200	220	230	250	260	275	3
												110	125	140	150	165	175	195	205	225	235	255	265	280	4

Credits and Debits for Abdominal Girth Less and Greater than Chest Expanded

Inches	20 to 30 % Overweight			35 to 40 % Overweight			Over 40 % Overweight		
	Ages to 40	Ages 40–50	Ages 50+	Ages to 40	Ages 40–50	Ages 50+	Ages to 40	Ages 40–50	Ages 50+
+4	+10	+15	+25	+20	+30	+40	+25	+50	+75
+3	+5	+10	+15	+10	+20	+25	+15	+35	+55
+2	0	+5	+10	+5	+10	+15	+10	+20	+35
+1	0	0	+5	0	+5	+10	+5	+10	+20
0	0	0	0	0	0	+5	0	+5	+10
−1	0	0	0	0	0	0	0	0	0
−2	0	0	0	0	0	−5	0	−5	−10
−3	0	0	−5	0	−5	−10	−5	−10	−15
−4	0	−5	−10	−5	−10	−15	−10	−15	−20

Credits for Endowments Maturing under Age 55

Age	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70	Pctg.
15	0	−5	−5	−10	−10	−10	−15	−15	−15	−20	−20	−20	
20	0	−5	−10	−10	−15	−15	−15	−20	−20	−20	−25	−25	
25	−5	−5	−10	−10	−15	−15	−15	−20	−20	−25	−25	−25	
30	−5	−5	−5	−10	−10	−10	−10	−15	−15	−15	−15	−15	
35	0	−5	−5	−5	−5	−10	−10	−10	−10	−10	−10	−10	
40	0	0	0	0	−5	−5	−5	−5	−5	−5	−5	−5	

For endowments maturing at 55 to 59 inclusive, allow 5 points less.
For endowments maturing at 60 to 65, allow 10 points less.

From *Selection of Risks*, Society of Actuaries, 1957

Schedule of Ratings for Blood Pressure

Ages	Diastolic Pressure—5th Phase (if only 4th phase is recorded, deduct 5 points to obtain 5th phase)												
15–29	60–69	70–79	80–84	85–86	87–88	89–90	91–92	93–94	95–96	97–98	99–100	101	102
30–39	60–69	70–79	80–85	86–87	88–89	90–91	92–93	94–95	96–97	98–99	100–101	102	103
40–49	60–69	70–79	80–86	87–88	89–90	91–92	93–94	95–96	97–98	99–100	101–102	103	104
50 & over	60–69	70–79	80–87	88–89	90–91	92–93	94–95	96–97	98–99	100–101	102–103	104	105

Ages													
60 & over	50–59	40–49	Under 40										
Systolic Pressure				Extra Ratings to be added to Basic Rating									
174	172	170	168	185	175	170	170	175	180	185	195	210				
170	168	166	164	155	150	140	140	145	150	155	170	185	205	215		
166	164	162	160	125	120	110	110	115	115	120	135	150	165	180	210	
162	160	158	156	95	90	85	85	90	95	100	110	130	145	160	190	230
158	156	154	152	65	60	60	60	65	75	85	95	110	125	140	175	215
154	152	150	148	50	45	45	45	50	60	70	80	90	110	120	160	200
150	148	146	144	25	25	25	30	35	40	50	60	70	85	105	135	175
146	144	142	140	15	15	15	20	25	30	35	45	55	65	85	115	155
142	140	138	136	0	0	0	0	15	15	20	30	40	55	75	105	145
138	136	134	132	0	0	0	0	0	10	20	25	35	50	70	100	140
134	132	130	128	0	0	0	0	0	10	15	25	35	45	65	95	
130	128	126	124	0	0	0	0	0	0	10	15	25	40			
126	124	122	120	0	0	0	0	0	0	10	15					
125	120	115	110	0	0	0	0	0	0							
120	115	110	105	0	0	0										
115	110	105	100	0	0											
110	105	100	95	10												
105	100	95	90	20												
100	95	90	85	30												

OPERATION OF TABLE

1. Unless identical, use the nearest figures BELOW the systolic readings recorded on the application.
2. On the line of the applicant's age group, find the column in which the diastolic pressure falls. The rating is in the column on a line with the systolic pressure for the applicant's age group.
3. All readings for which no rating appears in the table, require medical action.
4. For ages 10–14 inclusive, all readings up to and including 136–88 may be disregarded. All others require medical action,

Heart Murmur and Abnormal Heart Sounds

REQUIREMENTS.

Medical action on all cases.
Medical examination on all cases.
Heart chart or its equivalent completed by Examiner.
PRN current chest X-ray (6 ft. P–A and oblique films) of satisfactory quality.

Statement within 5 years.
Diagnosis. Description of murmur.
Systolic or diastolic. Area maximum intensity. Constant. Inconstant. Effect of exercise.
History of rheumatic infection. Cardiac enlargement.
Results of X-rays. Abnormal pulsation. Precordial thrill. Arrhythmia.
Dyspnea. Cyanosis. Hypertension. Arteriosclerosis.

CLASSIFICATION AND ACTION.

If the murmur has been present unchanged for 10 years, and there is no history of rheumatism, credit not exceeding 50 may be given for cases with negative X-ray, normal ECG and no other physical signs of disease PRN.

Description of murmur	No history admitted		History of rheumatism, chorea or rheumatic type infection—all ages				(To be added to other ratings)		
	Age		Years				Abnormal contour of hypertrophy by X-ray*		
	10–40	40+	0–3	3–7	7–10	10+	Slight	Moderate	Marked
Pulmonic systolic not transmitted	0	25–0	75	50	50	50	50	200	PRN
Cardiorespiratory	0	25–0	75	50	50	50	50	200	PRN
Third heart sounds, split or reduplicated sounds, accentuated or diminished sounds	0	25–0	50	30–0	30–0	30–0	75	115	PRN
Systolic apical, tricuspid or precordial *inconstant*, not transmitted	0	25	300	185	145	115	50	200	PRN
Systolic basic *inconstant*, not transmitted	0	25	185	145	115	75	50	200	PRN
Systolic apical, *constant*, not transmitted	50**	25	300	185	145	115	50	200	PRN
Pulmonic systolic widely transmitted, congenital	115	115	185	145	115	115	150	PRN	PRN
Mitral regurgitation; apical or precordial systolic transmitted to left	115	75	300	185	145	115	50	200	D
Mitral stenosis; apical or precordial diastolic or presystolic	400	400	D	D	400	400	D	D	D
Mitral regurgitation and stenosis	400	400	D	D	D	400	D	D	D
Aortic stenosis; rough aortic systolic transmitted up with aortic second sound weak or absent	185	115	D	400	300	185–115†	400–300	D	D
Aortic stenosis suspected, constant—not transmitted, not characteristic	115	115	300	185	145	115	D	D	D
Aortic regurgitation; soft diastolic blow from base downward along sternum, aortic insufficiency	300	300	D	D	400	300	D	D	D
Aortic stenosis and regurgitation	400	400	D	D	D	400	D	D	D
Pericardial friction rub	classify	under	peric	arditis					
History of heart murmur	classify	under	endoc	arditis					

* If enlarged clinically (no X-ray), use one degree of hypertrophy greater.

** If Examiner is well qualified and gives opinion murmur is probably not organic, case may be approved standard.

† Use higher rating for younger ages. Decline if under age 15.

PRN—Depending on the findings.
D—Decline.

SYNOPSIS

This Paper outlines the underwriting practice of the life insurance companies in Canada and the United States where, because of the importance of mortality results in the successful operation of a life insurance company, underwriting is considered to be a major executive function.

There is a discussion of general underwriting considerations and a more particular discussion of general underwriting practice. This covers the use of an Underwriting Manual, the Numerical Rating System, the use of additional information such as statements from attending physicians, special tests, etc., the question of non-medical insurance and the methods of setting up substandard classes.

Mortality investigations of various kinds are considered from the Underwriter's viewpoint which is to test the results of underwriting both in general and on particular impairments. There is a discussion of some current problems such as insuring female lives, insuring hypertensives, and the use of experimental underwriting.

The final discussion is on the importance of establishing an underwriting goal for the life insurance company, a goal which should be made clear to the agency force. It also stresses the importance of a good agency force in achieving the desired results.

DISCUSSION

The President (Mr. A. R. Reid).—Before introducing our main guest tonight I should like to welcome a number of other guests who are with us. They have been attracted both by the subject and by the author himself. We have the principal medical officers of certain companies. We are very delighted to have them with us and hope that, if any point occurs to them in the course of the discussion with which they would like to help us, they will not hesitate to do so. We also have Mr. Charles Wood, immediate past President of the Institute of Actuaries. Probably he is here because he feels it is necessary to have a sort of liaison between America on the one hand and the United Kingdom on the other in his capacity as chief representative of a Canadian Company in this country. We are very pleased to welcome him. We have certain other Institute members, among whom are Mr. Kitton and others who have been discussing today in Edinburgh other types of mortality risks than those we are going to deal with and we are exceedingly glad to have them with us.

There is also Mr. Steeds, from the Mercantile & General office, which has been providing such a very useful function in these days, and we are very glad to extend a welcome to Mr. Steeds.

Now I come to our principal visitor, who, of course, is not really a visitor at all, because he is one of our own Fellows. Andrew Webster became a Fellow of the Faculty in 1926, and if I were speaking in somewhat more free and easy surroundings I might venture to borrow a phrase used by one of my colleagues recently in London and expound on the theme that 1926 was a vintage year—there were eight of us altogether. It is naturally with very great pleasure that I welcome Mr. Webster, who was one of my own contemporaries, to give a paper to the Faculty during my term of office. I had known for some time that Andrew had been good enough to promise to do this, but it was only recently we heard that he had decided to come over in person to deliver the paper, which, of course, puts us much more strongly in his debt than ever, particularly when you consider the time of year at which he has come to this country and also the fact that he actually left Miami to come here. Mr. Webster has brought with him a personal message in writing from Mr. Pearce Shepherd, President of the Society of Actuaries. It is couched in such very warm and glowing terms, that I thought I would give myself the pleasure of reading it to you. With your approval I would like to send back with Mr. Webster, in reciprocation to Mr. Shepherd, the good wishes of the Faculty.

I shall not stand between you and the author of the paper tonight any longer, and have very much pleasure in calling on Mr. Webster to introduce his paper.

Mr. Webster, introducing the paper, said :—First of all I should like to say how pleased I am to be here. I feel it is a distinct honour for me to be able to come back to the Faculty after these many years, and I am delighted to be with you tonight.

I also bring greetings to the many Faculty members who were hosts in 1956 to a great many of my American friends and for whom we had a chance to do a little when they were over to the International Congress in 1957. There are so many that I cannot identify them all by name, but I

would particularly mention Mr. M. Albert Linton whom many of you know.

This paper is an attempt to set forth American underwriting practice in somewhat more detail than was given in the discussion at the XVth International Congress. I have emphasized in the beginning of the paper that the underwriter is an important executive in life insurance practice on the North American continent. This is not to imply that the same executive function is not exercised in British companies, but to contrast the recognition given to underwriting in the British fire and casualty companies with the relative non-recognition of the importance of sound life insurance underwriting.

In American practice we try to recognize the importance of the underwriting executive not only as a selector of risks but as a policy-maker, and then so arrange our underwriting that a great deal of it can be handled by a skilled and well trained group of laymen not at the executive level.

It pleases me greatly to find that the Faculty, like the Society of Actuaries, sees fit to include underwriting in the syllabus of examinations. In the required reading is the excellent paper by Dr. Hewat and Mr. Penn. The Institute, on the other hand, if Mr. Wood will permit me to say so, seems to assume that underwriting is of lesser importance although Mr. Perks' excellent paper is on the syllabus of reading.

One of the things I did before I left to come here was to read Mr. Lewis Orr's paper published 28 years ago. While the paper may be out of date with regard to current rating practice I would commend it to you for its excellent remarks on Selection. Some of these are so good I only wish I had thought of them myself. Mr. Orr states emphatically that "upon the selection of lives proposed for assurance depends to no small degree the measure of prosperity of a life assurance company." His definition of a first-class life cannot, I think, be improved upon. It is as follows: "A standard or first-class life may be defined as one whose family history, personal history, physical condition and habits are good and, it might be added, whose financial position is free from serious impairment and whose occupation involves no extra risk." He tells you about the importance of maintaining liaison between Home Offices and Branch Offices, so that the Branch Offices know what the Home Office is trying to do. He also points out that good Branch Office work is a form of primary selection and a valuable aid to the Home Office selection process. All these things are being practised day-in and day-out, and while I may have pointed them out in a different way you will realize that many of my comments are not very new. I did want to remind you that Mr. Orr's paper is really a classic of its kind.

I hope that the members will feel free to disagree with anything I have said because underwriting is a matter of opinion, and if you disagree with me then I am sure we will enjoy ourselves the more. Lastly before I sit down if I keep quoting American practice you will understand it is not because I think it is any better than British practice; it is simply because I have had more experience of American underwriting practice than ever I had of British practice.

The President.—Thank you very much indeed for your introduction. I did not know the exact terms in which Mr. Webster was going to introduce his paper, but I am sure you will all agree that, since he paid such a tribute first to Mr. Orr and then later referred to Mr. Penn, it is most fitting that to open the discussion I call on Mr. J. G. Wallace, who is the successor to both of these gentlemen.

Mr. J. G. Wallace. opening the discussion, said:—Mr. President, Gentlemen—I notice that some of our best speakers begin their remarks with a quotation, and I thought I would like to ensure at least one point of resemblance between my efforts and theirs by looking for a suitable quotation. I found one by Goldsmith, "People seldom improve when they have no other model but themselves to copy after"—a quotation which I would point out, Mr. Webster, is not unilateral in its application! I am sure you will all agree with me when I say that Mr. Webster has given us a clear and most interesting description of the American underwriting model. It is a great asset to the Transactions of the Faculty to have this description in its records, compiled as it is by one of the leading exponents of the subject in America.

I would like to refer briefly to certain differences between American and British conditions, and one of the outstanding points of difference is in the composition of the ordinary life business in the two countries. According to the 1957 Life Insurance Fact Book the ordinary life business in force in the United States of America in 1954, excluding group, included only 16% of endowment assurances. The new business in 1956 included only 8% of endowment assurances. I could find no comparable national statistics for the United Kingdom, but for ordinary new business and business in force in this country, excluding group, I would place the percentage of endowment assurances at a much higher level than 16% in force, and 8% of new business. Another way of putting this is that while the percentage of national income spent on life assurance premiums is about the same in both countries the ratio of life assurance in force to national income in the United States is much higher, probably at least twice what it is in this country.

It is therefore clear, I think, as Mr. Webster has pointed out on page 70 in his quotation from the *Economist*, that interest earnings have a more important influence on profits here than they do have in the United States; but I would cross swords with him in the inference he apparently suggests from this, that for this reason, in British companies, sound underwriting is treated with lesser importance than by their American counterparts. I would agree with him that our approach is a very different one and that the efforts devoted to underwriting in this country appear to be much less intensive than they do in America. From a limited amount of information relating to Scottish companies, the percentages of proposals underwritten at standard rates, with extra premiums, and declined, do not, overall, vary appreciably from comparable figures in America. This being so, it would be interesting to know whether or not there is a difference in profitability of underwriting impaired lives in the two countries. There is very little evidence available in this country as to the profitability of such underwriting, but the valuable paper by Mr. Wilfred Perks, presented to the Institute of Actuaries, and the discussion thereon, indicated—to put it no higher—that the underwriting of impaired lives in the United Kingdom was not proving a burden on the companies. His investigations, of course, only referred to profitability in each substandard class as a whole and did not distinguish between different impairments. I have not found any American analysis into the profitability of the underwriting of impaired lives—perhaps Mr. Webster can help here—but I wonder whether the more substantial expenditure on underwriting procedures by the American Companies, leading to approximately the same percentages of rated-up and declined cases, compared with the much simpler procedure adopted here, does really produce a higher profitability.

I am referring here to the procedure for the average-sized policy. I would agree, for example, that the use of electrocardiographic procedure on large-sized policies could probably be justified if even one case that otherwise would have been accepted and would have resulted in an early claim, could be picked out and rejected. This would probably pay the cost of the electrocardiograph for quite a few years.

Probably a partial explanation for the different procedures arises because of another important difference between the two countries. I refer to the sales side. As far as ordinary business is concerned in this country, I would say that the turnover in the selling staff is relatively small, but in the United States I have seen figures which indicate that of 100 sales representatives taken on in any one year, only 10 will still be so employed 5 years later. This must give rise to a considerable discontinuity and I would venture to suggest that much more screening has to be done at Head Office in the United States, where the population is more cosmopolitan, and its geographical spread is much greater, than in this country, where one can almost get to know how much reliance can be placed in the selection initially exercised by individual salesmen. This fact also probably accounts for the accepted feature in America of the issuing of what is called an inspection report in every case—a process which is rarely adopted in this country, and one which must be costly and must lead to some delay.

Probably the biggest difference between the two countries rests in the numbers of cases involved. In 1956, no less than $8\frac{1}{2}$ million new ordinary life assurances, excluding group and industrial, were effected in the United States compared to about $\frac{3}{4}$ million in this country. This is possibly the main reason why underwriting procedures have had to be made more mechanical in the United States.

At this point I would like to raise a question with Mr. Webster; there are, I understand, 1144 life assurance legal reserve life companies in the United States. Are these all independent companies, in the same sense as in the United Kingdom? If so, it is rather suprising to me to see that the average number of new policies per company is actually less in the United States than it is in this country.

Turning now to what might be called the philosophy of American underwriting practice, I find Mr. Webster's views most acceptable. I entirely agree with him that a major function of underwriting is to combat wilful anti-selection against the company. I would also agree with him when he says that " the risk-taking aspect is not sufficiently emphasized in life insurance ", a statement which no doubt applies with greater force in the United Kingdom, with its emphasis on investment, than it does in America.

Mr. Pearce Shepherd, present President of the Society of Actuaries, has suggested three practical stages in underwriting procedure, but he excluded from his analysis any allowance for the incidence of the risk. This agrees very largely with the view put forward by Perks that " the general level of substandard mortality is normally so speculative that refinements about shape can hardly fail to introduce a spurious accuracy that serves no purpose ". This is, I think, too sweeping a statement, but it cannot be denied that such investigations of impaired lives—mostly American—as are available give little clear-cut evidence as to the incidence of mortality for particular impairments. It might be mentioned that an interesting paper on this subject was presented to the Society of Actuaries by our former member, Mr. Charles F. B. Richardson. On the other hand,

theoretical calculations indicate that the distribution of the extra mortality has a very material effect on the extra premium required. Further, we have available to us the extensive experience of our principal medical officers and they can usually give us a clinical view as to whether the extra mortality in the impairment under consideration is increasing or decreasing in type. I feel, therefore, that there is a case for taking some account of the incidence of the mortality once its level has been broadly assessed.

It was interesting to read that American companies will give terms on lives subject to a mortality of five or six times the normal. For a life aged 30, this is roughly equivalent to about £2, 10s.% under a whole life policy, and about £1% under a 10 year endowment assurance. I think that in the United Kingdom we would also, in certain cases, go as far as this. What I found very surprising was that between normal mortality and this limit an American company might have as many as sixteen different substandard classes. This concept seems to me to be analagous to claiming to judge the extra mortality for a given impairment to an accuracy of about 15%. I do not feel that this practice can be justified. In the author's illustration, he has used six substandard groupings which cover mortality groups which can in broad terms be classed as $1\frac{1}{2}$, $1\frac{3}{4}$, $2\frac{1}{4}$, 3, 4, and 5 times the standard mortality. In United Kingdom terms, these groups would lead to extra premiums under a whole life policy for a life aged 30, of about 5s.%, 10s.%, 15s.%, £1%, £1, 15s.%, and £2, 10s.%, respectively. The American subdivision described by the author, seems to me to be very close to that adopted in this country and I find it eminently practical. Once the substandard group has been decided upon then I understand the American practice is to prepare a complete table of rates for that group, so that the extra premium varies by a small amount for each age. In my company—and I think probably elsewhere—an extra premium of 5s.%, for example, would normally cover quite a range of ages. I must confess that, bearing in mind the doubtful accuracy of one's assessment in many cases, I find the British method more acceptable, although I admit that the method one adopts must be influenced by the methods adopted by one's competitors, as Mr. Webster points out in his paper on page 82.

I would like to make a brief reference to non-medical business. Mr. Webster states that a limited amount of substandard business is being written non-medically in the United States. In my own company, it is our practice, if either the non-medical proposal form or the private medical attendant's report reveals an impairment, to stipulate for medical examination. The only impairment for which we at times grant terms on a non-medical basis is overweight, and then we usually ask for a certified height and weight card. It was also interesting to observe that the mortality experience under group life was favourable in the United States, but I am not clear as to whether American companies are troubled with the same high " free limit " sums assured enforced by competition in this country in connection with group life business.

Every time that a paper on underwriting is presented to the Faculty, or to the Institute, it is inevitable that complimentary references are made to the splendid American medico-actuarial investigation, and regret is expressed at the apparent indifference of the actuarial profession in this country. I would most certainly like to pay tribute to the extremely useful American investigations. Quite frankly, I have no hesitation in using them from the point of view of getting a broad idea of the severity of one impairment in relation to other impairments in America, with the

hope that the same relationship will hold in the United Kingdom. At the same time, there is no doubt that there is justification for the attitude adopted in the United Kingdom. Firstly, as Mr. Springbett showed so convincingly in his paper to the Faculty the data available for an under-average life mortality investigation is—apart from two or three major impairments—likely to be very limited. Secondly, as Mr. Webster himself has emphasised, investigations of this type are very expensive, and, of course, the companies, who would have to bear the cost, must judge whether or not it would be an economical outlay. On these grounds alone it seems to me that a major investigation into the mortality of United Kingdom impaired lives is not justified. I hope we shall hear later on from members of the mortality committee as to whether the pilot survey which has recently been undertaken is likely to encourage the promotion of subsidiary investigations. I do feel that the considerable value to us of the American investigations would be materially enhanced if we could compare the mortality of one or two major impairments in this country with the corresponding mortality in America.

There is one object which can be attained in underwriting, and that is consistency. In the United Kingdom, this has been achieved, certainly in my own company, by maintaining records—for instance, in card index form—describing the underwriting treatment given to various impairments. It is only recently, however, that a British reassurance company has produced an Underwriting Manual, which Mr. Webster has defined as the "primary tool of the underwriter". I would certainly agree with him that a manual of this type will be a valuable aid in maintaining consistency.

One of the most intractable impairments to assess is hypertension, and I would like to refer to some assessments resulting from the Table given in the Appendix on page 90b. The diastolic pressure is given as fifth phase, and, as it is normally the practice in my company to receive readings of the fourth phase, I have added 5 to the diastolic readings in the table, for the examples I am now giving.

The first point is that the American experience seems to place considerably more emphasis on increased systolic pressure than is done in my company. To illustrate my point, I took a life aged 49 and assumed a basic numerical rating of 95. I then took a constant diastolic pressure of 90. I found that for systolic pressure up to 149, ordinary rates would be granted under a whole life policy. From 150-157, an extra premium of 15s.% would be charged. From 158-161, the extra would be 25s.%; 162-169—£2%. Mr. Webster remarks, on page 88, "The underwriting of hypertension has always been difficult, perhaps because of a reluctance on the part of the clinician to recognise the mortality importance of even slight hypertension". I am inclined to agree with this remark. Certainly, these extra premiums—which incidentally are based on American mortality—seem much more stringent than those normally applied in this country for increases in systolic pressure only, and it would be very interesting to have the views of our physicians on the subject of slight hypertension.

The second point is that the American practice provides for offering terms for much higher diastolic pressures than we normally contemplate, at least in my company's practice. Perhaps this shows the more liberal risk-taking attitude of the Americans. To exemplify this point, I took a life aged 30 with a basic numerical rating of 95. I assumed a constant systolic pressure, on this occasion, of 140. Under a whole life policy, ordinary ratings would be granted for diastolic pressures up to 96.

From 97-102, 5s.% would be charged, from 102-104, 10s.%, 108—a very low pulse pressure here—15s.%. In my company, we are unwilling to offer whole life policies to proposers with these high diastolic pressures. Probably this is a case where we are allowing for the incidence of the mortality.

When I visited the underwriting departments of the United States life companies I noticed one difference between their procedures and ours, which Mr. Webster has not referred to. This was in the methods adopted in building up their corps of medical examiners. In the United States when a doctor is recommended by a branch official for appointment as a medical examiner the branch official must complete a lengthy form which must describe not only the qualifications of the doctor but also the amenities of his surgery, whether or not he has a weighing machine, what type of sphygmomanometer he uses and so on. Once a doctor is on the company's list, he may be visited from time to time by the chief medical officer, and the companies issue useful guides to their medical examiners—I have here the guide which Mr. Webster's own company issues. In some cases, careful records are built up about each medical examiner and periodically these are reviewed by the chief medical officer,who would take action to advise a medical examiner of any recurrent defects in his examinations. I would like to ask Mr. Webster if such thoroughness is general in the United States or whether it happened to be peculiar to the companies I visited. As far as I know no comparable procedure is adopted in this country.

Before I sit down I would like, through Mr. Webster, to express my own appreciation (and also I am sure of many of my colleagues) of the very friendly and open way in which we were received by the actuaries in the underwriting departments of the American life offices we visited during the Fifteenth International Actuarial Congress—and from no one did we receive a warmer welcome than from Andy Webster.

Mr. R. Ll. Gwilt.—While others are getting ready to contribute to what I am sure is going to be a most valuable discussion, I wonder if I may accept Mr. Wallace's invitation to say something about what the Mortality Investigation Committee is doing about the question of an Impaired Lives Investigation.

The matter is one the Committee has had before it for a long time now and, as you know, there are many difficulties involved including the difficulty of achieving consistency in the data that might be contributed by the various offices.

Meantime, an impaired lives investigation is being carried out by our largest life office, the Prudential, and they have kindly offered to put the results at the disposal of the Committee to be used as a pilot investigation in framing its proposals. It may be a year or more before any results are available and the Committee is in a position to reach conclusions.

The problem obviously bristles with difficulties and Mr. Webster in his paper refers to some of the doubts that have been in a number of minds in this country. One is the fact that the results when obtained relate to the past and what we are concerned with for underwriting is the mortality of the future which might be quite different as a result of new medical discoveries and methods of treatment. He also mentions the point that an investigation will probably only deal with the experience of a comparatively short period after selection and the extra mortality may be mainly at the later durations.

Mr. Webster gives his answers to these points and I do not propose to discuss them, but I would like to refer to another matter on which he quotes Mr. Lew as having said (*T.A.S.A.*, VI, 299]—

> " The relatively favourable experience found in the Impairment Study 1936 and unduly overoptimistic evaluations of recent advances in the surgical treatment of ulcers may have led to some unduly liberal underwriting of this impairment in recent years, which has apparently been reflected in the higher mortality ratios found in the present study."

That, Sir, is a danger that has been mentioned in this hall on previous occasions. There is the possibility that if an investigation shows low rates of mortality for lives with a particular impairment it may be because offices have been very careful in their underwriting of such cases and if they feel they have been too hard and decide to give more lenient treatment in future, the next investigation might show high mortality.

But, Mr. President, I must not ramble on without adding anything of value to the discussion and my only reason for intervening is to indicate that the Mortality Investigation Committee has the subject much in mind and will report to the offices as soon as it is in a position to make further proposals.

Mr. A. Bateman.—I would like to make three observations. The first is on an underwriting point which is of great topical interest just now. The United States gave us tobacco ; they gave us cigarettes later on, and still later they gave us the first views on cigarettes as a carcinogenic agent. I would like to know from Mr. Webster whether the American offices ask the proposer for information about his consumption of cigarettes and if there is a history of heavy smoking, do they take any action and if so what ? Secondly I was very interested in Mr. Webster's remark that the field force in America have an appreciable effect on the underwriting of the offices. In this country I would say that this is not the position except to the extent that the field force never leave the head office in any doubt as to what they think when a proposal is rated-up or declined. I would be interested to know just how the influence of the field force on the Home Office in the States is effected. For example, I do not think that a numerical factor can be used for such an indeterminate feature, and if, after an extra premium is found to be necessary on the usual numerical rating, it is decided to make some allowance for the importance of the agency involved I would like to know whether the variation is left to the actuary himself, or whether being of the nature of a non-actuarial decision, it must go to the Board of Directors.

My third comment is of a more general nature. I see that towards the end of the paper Mr. Webster visualises a machine which will develop the sixth sense essential for underwriting. I would like this machine to have a seventh sense which would enable it to predict that although everything on the proposal form looks unfavourable the case will be perfectly all right !

Mr. C. S. Penn.—I would like first of all to say that it is a great pleasure to us to have Mr. Webster here in person, and to take this opportunity of thanking him for the great help he gave to Dr. Hewat and myself over the paper we gave five years ago. I am glad he referred to Lewis Orr, because Lewis Orr's paper was unique ; the original paper was written in

1921, and it went so well that he was invited by the Council to make it up to date and submit the revised version at a second meeting of the Faculty ten years later in 1931. I think that was without precedent in the Faculty.

I have been rather out of touch in the last three years with underwriting practice myself, and have some hesitation in intervening. As Mr. Wallace has pointed out the immense volume of business in the United States must in any event have forced the adoption of some such system as is described in the paper. In fact I had expected that by this time electronic underwriting would have arrived, and I am somewhat relieved to see what Mr. Webster says at the end of his paper, because in my opinion underwriting is an art, not a science.

He refers at the beginning of his paper to the underwriter as an executive. In my own Company, which, of course, is a small Company even for Britain, although it has grown, the Chief Officer has for many years been also the underwriter, and that may have been due to the fact that an unusually large proportion for this country of its new business is written on the Whole Life plan ; on the other hand it may have been due to the personal predelictions of successive Chief Officers of the Company. There is one other point I would like to refer to. When I was in New York in 1938 for the English Speaking Conference considerable anxiety was expressed about mortality under large policies in the United States, which apparently had been very bad indeed. It is interesting to note from the paper the improvement which has taken place, which is ascribed to electrocardiograms, X-rays of the chest and so on. We here have a problem now which we did not have in 1938. Over the last ten years I believe the number of large policies in this country has increased considerably as a result of the vagaries of our taxation system, and particularly the death duty problem. It might be useful to have an investigation of the mortality under those large death duty policies, and individual pension policies. The people who effect these policies are often well up in years and considerably involved in the stresses of business and financial affairs, and it seems to me that the mortality may be bad there. On the other hand whether or not such an investigation is worth while is a moot point, because one may suspect that this type of business might well be a temporary feature and not continue indefinitely.

Mr. N. M. Law.—I judge that Mr. Webster is an advocate of the use of the underwriting manual—I may be wrong in my view, but I get the impression that it leads to perhaps over-simplification and perhaps to too strong an approach to classification, and indeed almost to "push-button" classification. There were one or two points I would like to mention. Mr. Webster has suggested that in many cases, even complicated cases, the underwriter can without any reference to medical officers assess the risk. I imagine that unless the risk was a common one, clearly defined and relatively unimportant we would be inclined in this country always to consult our medical officers and not to judge the case without that reference. He spoke also in his paper of the art of underwriting. I have always assumed that in no good form of art can you learn the rules from a manual, and as far as I can see, I think that the art of underwriting lies, not in dealing with the common rated-up case, the case where you can assess the extra charge at 10s. or £1, but rather in dealing with the borderline case where you might be able to accept at ordinary rates or avoid declinature. A wrong decision in these cases could damage the reputation

of a Company. Then he mentions that in large cases it is usual as a matter of routine to call for an E.C.G. or X-rays. I think in this country we would probably feel it was more satisfactory in a large case to employ an examiner with first-class degrees, a man of wide experience and sound judgment on whose opinion you would decide whether to take any further steps.

Mr. D. W. A. Donald.—I was tempted to cheer at two points made in Mr. Webster's paper, and although Mr. Wallace has referred to them already I think they are sufficiently important to be emphasised further; they are the importance of mortality profits in the bonus earning power of a life office and the fact that underwriting a risk if it can be underwritten at some terms, and not avoiding it, is the business of an assurance company. As to the first, the gentleman (quoted on page 70), who wrote in the *Economist*, was speaking absolute nonsense; it is not interest earnings that largely determine bonuses, it is the bonus loading that the actuary of the company has put in his with profit premiums—in this country at least. Over and above the bonus provided by that loading there is an element of true profit. That element is relatively small, relative that is to the total size of the bonus. Of this true profit the greater part probably comes from interest, but the contribution from favourable mortality though only a fraction of the total bonus may be a far from insignificant proportion of the true profit, and I think we run a grave risk by saying that, with interest rates as they are, mortality does not matter. If, for example, it was thought that 3% were an appropriate rate at which to calculate with profit premiums, the differences between the A 1924-29 and the A1949-52 net premiums for whole life policies run from 2s. 6d. at age 20 to 7s. 10d. at age 60; the differences in A1949-52 net premiums for a movement of a $\frac{1}{2}$% in the rate of interest run from 2s. 1d. at age 20 to 3s. at age 60. So far as whole life policies are concerned the improvement that there has been in 25 years in mortality is more important than a movement of $\frac{1}{2}$% in the rate of interest assumed in the calculations. Naturally, in endowment assurances there is more scope for interest profit and the mortality element is less important. Even so similar sets of calculations for an Endowment Assurance at age 65 show as between the A1924-29 and the A1949-52 tables a practically constant difference of 2s. A movement of $\frac{1}{2}$% in the rate of interest involves differences varying from 2s. 10d. at the longer terms to 4s. 6d. at the shorter. Even here the influence of mortality is significant. We do write quite a volume of whole life business even if, as Mr. Wallace said, the bulk of our business is endowment assurances, and I think anyone who suggests that mortality matters little as compared with interest is not facing facts.

The second point is that it is always easy to deal with a risk by refusing to accept it, and that it is the job of the underwriter to underwrite a risk when he can. Risks cannot be underwritten without knowledge, and increased knowledge may sometimes suggest to us that risks which we have refused to underwrite in the past could in fact be put on our books. It may even, as Mr. Gwilt pointed out, indicate that our past practice has been too favourable in some respects. Mr. Webster quotes the case of peptic ulcers as an example of this. At the risk of crossing swords with Mr. Wallace and others, I do not feel that the British actuary can really be entirely satisfied with the extremely vague information he has available in British conditions about the mortality of impaired lives and perhaps even more important in view of recent developments, the mortality which is likely to be experienced in the large number of cases now being put on

our books in pension schemes where relatively large sums assured are being granted with virtually no evidence of health at all.

Some of the objections have been mentioned ; that of expense, I suppose, is the main one. The argument that we cannot be trusted to interpret the results of what would admittedly be an unsatisfactory kind of investigation seems to me a slur on our profession. I do not believe it and I am glad that Mr. Webster has come here and shown us that there are in America companies who have undertaken all these " dangerous " investigations, and even more daringly have actually made use of them, without dire consequences to their offices and indeed with the knowledge gained have often been able to underwrite risks which British actuaries would have turned down. This point of view is not new, indeed it was well expressed almost 100 years ago when that doughty controversialist Charles Babbage wrote, " *Let it not be feared that erroneous deductions* may be made from recorded facts, the errors which arise from the absence of facts are far more numerous and more durable than those which arise from unsound reasoning respecting true data."

Dr. J. G. M. Hamilton.—I feel that I am taking an undue liberty as a guest, and, if I may say so, a very grateful guest, in speaking at all, but I would like to take the opportunity of asking one question of Mr. Webster, and of making one comment. My question relates to the portion of his paper in which he describes the increasing use of the electrocardiograph and radiography in American Insurance practice. This seems to be a reflection of the expansion, perhaps even into the rarified sphere of the work of actuarial science, of the public's attitude to the machine, the assumption which the public in general makes that a mechanical aid to medical diagnosis has some form of magic infallibility. My question, sir, is this, granted that the experience has shown that the use of cardiograms and X-rays does pay off, could Mr. Webster tell me the manner in which these things are used ? Is cardiography for example, entirely a Home Office exercise, or is it carried out in the periphery ? Who reads the cardiograms ? Does the underwriter depend upon the interpretation of the cardiogram by some Tom, Dick or Harry far away, or is the cardiogram read and read only by the Chief Medical Officer at the Home Office ? The latter would seem to be the only proper and reliable way of using this technique.

My comment, sir, is this. I wish to refer to the subject of non-medical proposals. It appears to me that the statistical material upon which underwriting is based is strongest in the sphere of height and weight measurements, and very weak indeed in some other directions including blood pressure readings. If this is so, if height and weight measurement are things upon which reliance is placed in estimating mortality then I question if we do it properly. Owing to the general public's well-known aversion, indeed well-known ignorance of the value of accurate mensuration and owing to the general public's well-known objection to veracity, the figures for height and weight recorded in a non-medical proposal form seem to me to be very poor material upon which to found anything. One speaker did say that in non-medical business he was in the habit of sending for certified weight cards, but I take it from what he said that such were called for when the figures given by the proposers indicate the existence of over-weight. It is I think common knowledge that in non-medical proposals these figures, especially of weight, are always nearer model than the truth. Of course, I do not know where we get with certified

weight cards; not all chemists have their machinery certified by the Inspector of Weights and Measures, though some do, and there is here again a touching assumption that you have only to send a proposer to a doctor to have him weighed in his room, and you will get something which is accurate. This is naiveté. Even if the chief medical officer visits all his examining doctors up and down the country and looks at the weighing machines, doubtless a very desirable exercise, it is questionable whether it will pay any dividends at all. I should think, sir, that the use in non-medical proposals of the certified height and weight card must introduce a greater measure of accuracy than is presently obtained. You, sir, and your members will, I am sure, be aware of this which has struck me, namely, that where a non-medical proposal is made by a life who is already insured and for whom previous information was obtained at medical examination, it may be five, it may be ten, it may even be twenty years before the proposer records the weight which was recorded when his medical examination was previously made. This is often quite surprisingly accurate to half-a-pound, which I submit is a *reductio ad absurdum*.

Mr. A. J. Steeds.—This is my first visit to a Faculty Meeting, and I am very delighted to be here; it enables me to pay two tributes, the first to the Faculty for giving us a succession of very good papers on underwriting since 1945; I think this is the fifth, and we are very grateful to the Faculty. They have perhaps treated us more kindly than my own Institute. I am glad to be able to pay a tribute to Andy Webster; meeting him was the best of good fortune for me at Scheveningen in 1951, and since that time he has taught me quite a lot about underwriting, and I am very indebted to him. We used to hear a lot about unrequited exports; it seems to me that Andy Webster is typical of the requited export. I think that he is unnecessarily fearful of the ignorance of British actuaries on the subject of the numerical rating system; I think we know more or less what it involves, and perhaps one could sum up the argument in the vernacular "What has he got that we haven't got?"; the answer seems to me to be the Medical Impairment Study. I do not think however that in his paper he needs to defend American practice; I think that he has refrained with great generosity from being at all critical of our practice here, but I think that if you read not merely between the lines, but some of the lines themselves you can infer criticism of what we have not done; if I may quote four excerpts:—

"The primary tool of the underwriter is an Underwriting Manual."
"The Underwriting Manual has a statistical background."
"It is impossible to produce an Underwriting Manual without some information as to mortality under a number of basic impairments."
"Some statistical investigation is necessary."

There have been many arguments for and against conducting a medical impairment study in this country and I venture to suggest that the author's paper is another argument in favour of such an investigation.

The author in discussing the reasons for underwriting makes two very good points, basic points; firstly, that we are underwriting in order to control the quality, as it were, of the mortality experience on standard lives; secondly, that we are underwriting in order to combat anti-selection. It is interesting to reflect on the variation in standards between one time and another, and one office and another. For example, I take it that the standards of underwriting of the data of the A1924-29 table had changed

considerably meanwhile and that the body of assured lives whose mortality was investigated for the A1949-52 table would represent selection by quite a different standard. I also suppose that the standards vary tremendously between offices; in fact, I know this to be the case. It is quite clear that this is right and proper in a country where there are a number of completely independent offices, each with a local or sectional attraction, and I think it is a good thing that there should be this variation; whether it is too great or not, I am not sure.

I think it would be interesting if the author had compared the results of underwriting in the United States and here. Mr. Wallace has already dwelt on this point a little. I take it that we would agree on what is a standard life within fairly close limits and that we would also agree more or less on the kind of life we have to decline. I suppose that he would find that we are much less consistent in our underwriting of that small section of the business where we have to charge extra premiums, and I suppose that in the United States the numerical rating system and competition in underwriting substandard business would lead both to more consistency and also to lower extra premiums. I wish that the author had given us a paragraph explaining how they go from the results of the Medical Impairment Study to the ratings we find in the Manual. He has gone on record in the Transactions of the Association of the Life Assurance Medical Directors of America, in which you will find a very interesting paper in which Andy Webster explains how this is done, and explains how within limits they take account of the incidence of the extra mortality. I would disagree with the author in wishing to substitute for the mortality tables which are apparently in use in the United States, a system whereby you impose a flat extra premium, because otherwise the extra premiums are too low; it would have been my opinion that with mortality now as low as it is for a large range of ages there is a case for reducing the minimum extra premiums to be charged from 5s.% which is probably the minimum for most offices, down to perhaps half-a-crown, because for younger lives and endowment assurances that modest extra premium is sufficient to cover quite a degree of extra risk.

I am surprised that the author has found the analysis of early deaths claims to be so useful; I know that the size of the offices in North America is quite fantastic compared with the size of offices here; I should have thought that it was apt to be an unrewarding exercise, except that it might encourage a ready wit in the actuary explaining his actions before the Board of Directors. In referring to the "sixth sense" I think the author must be pandering to British actuaries; here we are accused of subjective underwriting, and that implies a sixth sense. Perhaps it would not be entirely humorous to suggest that a sixth sense is what you need when considering whether the rating of a large and tricky case would be considered adequate by a reassuring office.

Finally, Mr. President, I am very glad to be able to join the members of the Faculty in thanking Andy Webster for his paper, and all his other services to life assurance underwriting.

Mr. D. Whitehead.—One point that did impress itself on me when reading the paper was that the American and the British practices in underwriting are coming closer together. I sense that the Americans feel that the strict Numerical Rating System was not enough so that one ought to apply a certain amount of discretion in interpretation, and make adjustments to the theoretical results. We have changed quite a lot from

the idea that each case be considered individually *ab initio*, and although we probably have not Manuals in the full sense of the American use of the term, we are building up a practice which, when statistics become available from whatever source, is checked, and it does tend to make our underwriting more and more routine.

I agree with Mr. Webster and several others who have spoken in this discussion that we should try and assess a risk rather than take the easy way out as we sometimes do, by turning down the proposals. In particular in the case of scheme policies, the institution of an endowment insurance scheme probably means that we have a moral liability to do so. But of course this would mean we would have to break away from the usual maximum extra premiums of 30s. to £2%, and charge more than that. Of course there is a more general use of debts as a method of assessment and these are a more flexible way of assessing impairments, in particular major impairments. The difficulty in such an approach in this country is, of course, the lack of statistics, and we must all be grateful to the Americans for the tremendous amount of information which is contained in the Impairments Studies. The difficulty is how to use this information, because we do not know the details as to how those statistics were collected, and in any case the experience of American companies on American lives may not be appropriate to the experience of British companies on British lives. One suggestion has, of course, been strongly mooted, that there should be an investigation of impaired lives in this country, but I feel rather doubtful about this. I do not think we use sufficiently a lot of the statistics that we have available. There is quite an amount of information in the Registrar General's reports, not only the ordinary Annual Reviews, but the other periodic reviews which he brings out. One can draw from one's own office's experience, and of course we must always remember that there is a considerable amount of statistics in medical journals which can be used for our purposes. A final suggestion which might be of use is a follow up of cases which offices have declined and either issued Deferred Annuities or alternatively 100% debts. There should be quite a considerable body of information available about serious impairments, and I doubt whether it would be found that the experience of those lives would be as serious as might be expected by the severity of the underwriters' decision. In fact, an investigation of this kind has been carried out on the Norwegian experience.

One point of American practice has been exercising me recently which Mr. Webster may be able to solve. This is which blood pressure reading is used by the companies in assessing the risk. Supposing an office gets two readings given in the medical report, there is a choice of either taking the higher or the lower or the mean reading, and it is possible that there might be quite a difference between the three readings. For instance, if the first reading was 145/95 and the second was 135/85 the mean is 140/90. For a proposer aged 35, the higher reading implies an additional rating of 60 ; the mean reading means an additional rating of 30, and the lower reading means no additional rating at all. The terms quoted will therefore depend on the rules for fixing the figure to be used in entering the table. In general, unless the same rules are common to all offices, the data collected regarding blood pressure is heterogeneous and also divergences in its interpretation will arise. I wondered if there was some rule common to all American offices.

Mr. C. F. Wood.—I would like to thank you for the warm welcome

which you extended to me and for giving me the opportunity of saying a few words on this interesting paper. From someone with Mr. Webster's reputation an interesting and instructive paper was to be expected, and to make sure that this would be so, Mr. Webster, with his true native caution, told us that he had his paper reviewed, first by an actuary who did his early training in this country, and second by another actuary who did his early training with what I regard as one of the finest Canadian companies.

Mr. Webster indicated in the early part of his paper that actuaries in America are not protected in their underwriting by the cushion of interest rates, and his point has been commented on in the discussion, particularly by Mr. Donald, who gave us some interesting figures on the relative effect of changes in interest and mortality. The fact remains that the composition of the business written in America and in this country is very different in the proportions of life and endowment types of policies. If one takes the business in force in three groups—life, endowment, and other classes—the proportions in the United Kingdom are roughly 20%, 60% and 20%. In the United States, these proportions are roughly 60%, 20% and 20%. But that is not the whole story. A large proportion of the business in the other classes group in this country is children deferred and most of the business in the other classes group in the United States is term and family income. The President of one of the Canadian companies at a recent annual meeting said: "To protect his family is one of man's nobler instincts; to make provision for his old age is just plain commonsense." I suppose one can deduce from the figures I have given that the Canadians and Americans are the nobler race, and the Scots and English have more commonsense!

Mr. Webster rightly stresses that the numerical rating system is not a system of assessing premiums, it is merely a convenient system of classification aimed at producing consistency. Consistency in underwriting is valuable from the point of view of maintaining the reputation of the company with the public, and maintaining the company's reputation with its field force. An actuary writing in another context has said that consistency is better than accuracy, which I would adapt in the context of underwriting by saying that as we cannot have accuracy, at least let us try and get consistency. A system which produces consistency in underwriting is important where there are a number of different officials having the authority to give decisions. The numerical rating system is particularly valuable if you have officials on two sides of the Atlantic, both having authority to give decisions.

A further advantage of the numerical rating system which may not be fully appreciated is its usefulness as a tool for training underwriters. It is a comparatively simple matter to instruct clerks—female as well as male—in the use of the system. Soon they are in a position to recommend extra premiums on a large proportion of the cases which come before them, and as these recommendations become acceptable to the official who has to make the final decision, their confidence in their own ability is built up. Gradually they gain experience which develops a sixth sense—that sixth sense which Mr. Webster rightly indicates is essential to good underwriting.

The President.—I am sure you will agree that we have had a most interesting discussion—there has been a very large number of most interesting questions put, so much so that I was toying with the idea of

breaking with precedent and getting Mr. Webster to answer the questions as they were put, but I did not do so.

The speaker often says at the end of the discussion that he will give a written reply, but I am exceedingly hopeful, and I have no doubt you are too, that Mr. Webster will be able to deal with some of the points tonight.

However, before I call on him I have much pleasure in asking Mr. George Menzies to wind up the discussion from the body of the hall.

Mr. G. F. Menzies.—On page 73 the author refers to what I might call, the diffidence, with which British actuaries approach the Numerical Rating System. On the one hand we do not adopt it, at any rate in its entirety, and on the other hand we do not criticise or say what we think is wrong with it. Almost he infers that we do not take the trouble to study it or understand it. On that at least I can reassure him. We are very grateful to our American colleagues for the system and for the statistics which underly it. We hesitate to criticise because our criticisms must be mainly destructive; we have no constructive alternative based upon British statistics.

Our reasons for not embracing the system are more complex. In the first place there is the obvious one that conditions pertaining in America do not apply here, and in the second place I think we accept, or perhaps I should say, resign ourselves to the belief that meticulous accuracy in the rating of substandard lives is unattainable. Mr. Gwilt has mentioned the statistical difficulties which confront us here and Mr. Steeds has repeated the plea so often made that we must have statistics.

Personally I feel that it is doubtful if collective British statistics will ever be large enough to sustain a worthwhile breakdown into homogeneous impairments and then in those groups into the further age and/or duration variable which will be necessary. Even the Americans with larger statistics at their disposal meet this difficulty. There is the further difficulty that the period of investigation must be short and the results quickly available, otherwise the progress of medical science may outdate any results which we could obtain. If the period is short then the deferred effects of impairments cannot be studied. I believe, therefore, that when if ever we do have British statistics available, analysis of them along numerical rating lines will prove impracticable.

It is not in my opinion fair to criticise numerical rating on the score of neglecting the incidence of the extra risk, as one or two speakers have shown. As the author points out on page 72, the primary object of the system is to place substandard lives into homogeneous groups, which can, with some claim to scientific accuracy, be charged the same extra premium even though the members of the group suffer from widely different impairments. The method does give extra premiums but the underwriter need not necessarily accept them as correct.

This process of grouping, in fact, is what we try to do in Britain; I hope our medical friends will forgive me, if I say that with their help we do it empirically. Most British Offices are content with about four groups, and in those groups the premiums charged vary to some extent with class and age.

In the example on page 81, six groups are used. For a life age 40 on a fifteen year endowment assurance this would imply extra premiums rising from about 3s. to £1% and for a whole of life policy rising from about 9s. to £2, 10s.%. At ages above 40 the maximum whole life extra charge would rapidly become prohibitive and I presume proposers would

be restricted to a suitable endowment assurance. Rightly or wrongly these fine gradations are foreign to our practice and I fancy most British offices would be content with groupings to the nearest 5s. and possible decline for group F.

Mr. Wallace referred to the fact that the amount of life assurance in force in America is much higher than here. Possibly one result of this is that in America sheer numbers forced the adoption of numerical rating, for administrative reasons, if for no other. It emphasises another factor and that is the fact that assurance in this country is very much sold to the public and not bought by them. For this reason I think that we have less to fear from anti-selection than in America.

Mr. Donald accused *The Economist* of one hundred per cent. nonsense in the statement quoted early in the paper. I think this is altogether too sweeping. There has undoubtedly been an upswing of bonuses here over the past ten years, and I think that that upswing has been due to interest. I would therefore accuse *The Economist* of perhaps fifty per cent. nonsense!

I doubt whether the follow up of declined cases which Mr. Whitehead suggests would really be very helpful. I imagine that what he would examine would be a very biased sample from which all the not-quite-hopeless proposers had been eliminated.

Much has been said tonight about the incidence of extra mortality and I am not sure that I agree with the author that it has no practical value in day to day rating. If in ordinary practice a doctor buries his mistakes, in medical prognostication he is apt to be slapped on the back by a healthy octogenarian whom he declined perhaps 20 years ago.

I have never personally accepted entirely the increasing, constant or decreasing, conception. It has always seemed to me that the curve of mortality for a substandard life should start very close to the normal curve, rapidly diverge from it as the efficacy of the initial selection wears off, reach a maximum difference and then regress back towards the normal curve. It reverts back to normal for two reasons ; first, because the worst substandard lives die off, the second, because the normal group is itself deteriorating. This, of course, is merely speculation on my part, though on page 86 the author suggests that there is statistical evidence to support it. If there is anything in the theory, then logically, it seems to me, extra premiums should be limited to a period short of the full term of the policy and that would leave the chief medical officer with some defence against the octogenarian critic.

The American practice of differential rates for females is hardly likely to find acceptance here on practical grounds. Most of the policies effected here by females are of the endowment assurance type and for relatively small sums assured. The comparatively small differences which could be made in the premiums would hardly warrant the very considerable expense and trouble which separate tables of rates would involve.

On page 79 the author suggests that British practice with regard to non-medical business is, in general, more liberal than American. One reason for this may be the fact that in this country proposers must warrant the truth of their answers. Any breach, intentional or otherwise, of the warranty would provide grounds for repudiation by the insurer. Whether this is fair to proposers or not is another matter, but the fact remains that the condition is a powerful safeguard in the transaction of non-medical business. Mr. Webster says that American policies are incontestable after two years and in this respect the offices are in a less favourable position than British Offices.

Mr. Wallace started this discussion with a quotation; may I close it with a story. The statement on page 86 to the effect that " investigations show the actuary where he has been, if not where he is going," reminds me of the proposer who had just undergone medical examination. The doctor was filling in the information on the form and the proposer was very anxious to know what was going on. He said to the doctor, " Well, doc. how do I stand ? ". The doctor replied, " That is precisely what I am trying to figure out."

We know how we stand, we stand very much in the author's debt for coming over here and for producing this most interesting and stimulating paper.

Mr. B. C. Lucena wrote :—The general use in Britain of an underwriting manual with numerical rating would provide a degree of consistency between Offices which may not be sought, because the less uniform system now in use enables Offices to vary their standards of selection and this variation is to some extent reflected in the scales of premiums and level of bonuses.

One has to guard against too rigid an approach in selection; when using a rating manual daily one finds it necessary constantly to allow for variations in individual lives which the manual would classify as equal. To give one simple example, every Office has its share of early claims on apparently unexceptionable lives, due to coronary occlusions and the like where there has been no history of an earlier attack, and the manual would provide for no loading. Yet probing of early deaths of parents or siblings, or of occasional disregarded pains, might well have caused the underwriter to suspect a more than normal possibility of an attack of coronary disease.

On the question of substandard mortality to be expressed as a percentage of normal, this can occasionally be misleading because in certain cases the extra risk is largely independent of age. For example, the additional risk for a history of a partial gastrectomy, although permanent, is chiefly a function of post-operational duration, the loading being not much affected by age. One would impose a constant charge according to this duration, which charge as a percentage might vary between, say, 200% of normal mortality at a young age to 50% or less in the case of an older proposer.

I endorse the author's approval of regular study of early claims as a means of checking careless underwriting and putting the underwriter on his guard against a too facile assessment of what appears to be a simple fact. I recall one such claim of a few months duration where everything was normal except for a history of " removal of a wart from back "; when the claim was presented, investigation showed the so-called wart to have been an epithelioma !

I suggest that lighter mortality for females should be accepted with reservations. It is true, of course, in the aggregate, but female mortality at the assuring ages varies greatly with marital status. The mortality of spinsters as a whole is much worse than that of married women, no better than that of male lives in some groups. This is probably due to the selective force of marriage among a rapidly declining body of spinsters and it may not be safe to say that unmarried women of 30 years or more are entitled generally to better terms than are offered to men, particularly as business on female lives is largely accepted on a non-medical basis.

Mr. Webster replied verbally to the discussion and his remarks slightly amplified after consideration were as follows :—Thank you very much for

the interesting discussion of the paper. I am surprised that more people did not disagree with me, and I shall try to answer the questions that have been raised.

Mr. Wallace drew attention to the different composition of the business in North America and in Great Britain, and the point was also discussed by Mr. Wood. The question is not altogether one of the composition of the business; the question is one of antiselection. It is quite true that in endowment assurance the amount at risk is very much less, and the underwriter, therefore, may feel he can take some chances. Mr. Menzies mentioned something about offering endowments in place of selling life policies. There have been attempts to do this: to offer either endowments or life policies with an automatic surrender clause to slightly substandard lives, apparently on the theory that the extra mortality was probably deferred beyond the date of termination. The experience showed that there was an extra mortality in the group from the start so that the insurer lost on this arrangement. Higher priced plans do not absorb the extra mortality—they merely reduce the amount at risk.

Mr. Wallace asked whether there was any measure of the profitability of substandard insurance. Most companies of any size, and that is not necessarily the largest ones, will run a periodic test on whether their substandard mortality is coming out on the right side as far as dollars and cents are concerned. The larger companies will test their own experience on certain impairments although most of the investigations of mortality by impairment are made by the industry.

I must disagree with the speakers who questioned the value of any investigation because of the limited exposure both as to numbers and duration. I might point out that the numerical rating system was introduced when there was not an abundance of statistical material available. The most common impairments in practice are overweight and circulatory conditions (generally higher than normal blood pressure). There should, it seems to me, be enough material available to give significant results from an investigation into these impairments and this at least would be a beginning. Mr. Whitehead has suggested that there are other sources of statistical information and perhaps these have not been adequately explored on either side of the Atlantic. The arrangements that the Faculty has made with the Scottish Statistical Research Bureau could well be productive of some results of underwriting value. The investigators, I think, should be encouraged to publish their results, however meagre, in the form of actuarial notes.

Mr. Gwilt quite properly points out that statistics are not the be-all and end-all. Careful interpretation and translation into ratings are needed. It is helpful, however, to find out if the underwriting of impaired lives has been profitable and to find out also if the underwriting of an impairment is on the right track.

More than one speaker referred to the volume of business by the North American offices as a justification for the use of an underwriting manual. The real problem in all companies' underwriting, as Mr. Wood has pointed out, is consistency. It may be a more sparkling jewel where large numbers of cases are handled, but it can shine even where small numbers are involved. Most of the companies, large or small, will use an underwriting manual and the numerical rating system in one form or another. To answer Mr. Law, the use of the manual enables many decisions to be made without reference to a Medical Director. Action on applications involving such impairments as overweight, blood pressure and the more common

urinary findings, albumen, casts, etc., can be left to intelligent laymen once the basic debit values are established. The art of underwriting lies in recognising when the case is not completely covered by the rules, and these are more frequent in practice than might be expected.

In reply to Mr. Wallace's question the large number of life insurance companies in the U.S. (the number is now around 1300) are all independent companies. Many of them are very new and consequently very small, and a great many of them operate in limited areas of the country. The efforts of many of them, for example, may be confined to the State of their domicile. The Life Insurance Fact Book for 1958 mentions that 87% of the companies are stock companies, but that the mutual companies account for 63% of the total life insurance in force.

The comments on substandard classes and methods of meeting extra mortality are very interesting. The sixteen classes is a relic of the days when the mortality was higher and the divisions more significant in terms of extra premiums. There has been some tendency to get away from these large numbers of substandard classes, but they have been retained because of reinsurance convenience. A large amount of reinsurance is done on a yearly renewable term basis, and the relatively fine gradations in the extra premiums seem to be well adapted to this form of reinsurance. Mr. Wallace's method of flat extra premiums as opposed to percentage extras is an excellent method of classification at the younger ages. I suggest that it breaks down at the older ages where the extra mortality under an impairment may be a percentage of the standard. The flat extra premium may be inadequate. The idea, however, is not to be lightly discarded, as I have mentioned in the paper. Mr. Menzies makes an excellent point in suggesting that if the curve of substandard mortality eventually approaches the standard curve we might limit the period during which an extra premium is payable. There may be administrative difficulties in not having the extra premium coterminous with the premium on the policy. In some instances the extra premium does take account of the shape of the substandard curve by assuming in calculating the rates a fixed addition rather than a percentage addition to the mortality rates at the higher ages.

I might have mentioned in the paper that in setting up the substandard classes the insurer decides how much can be absorbed in the standard premium. This is a practical question and can perhaps be best illustrated by an example. In U.S. practice at the present time we grant standard insurance to pilots on commercial airlines. These pilots are subject to some extra mortality. On the basis of the experience of the last few years the extra hazard calls for an extra premium which is sometimes less than and sometimes a little more than $1.00 per $1,000. The minimal occupational extra is $2.00 or $2.50 per $1,000. To charge either of these amounts would be excessive for the hazard, and so the slight extra is absorbed in the standard premium. There are other occupations where we know that the mortality is on the edge of standard, and these are treated similarly.

Mr. Wallace and Mr. Whitehead raised questions on blood pressure ratings. Our examiners are instructed to record all blood pressure readings, but a good examiner will try to put the applicant at ease before taking a reading. We are attempting to get the basic blood pressure, and the standards of the American Heart Association are used by all companies. If the readings on examination are outside the standard range of acceptance a second reading will be called for and the results averaged before a rating is imposed. This gives the applicant the advantage of any low

readings to offset the high readings. There is a question in the minds of some underwriters both medical and lay as to whether a labile blood pressure is but a forerunner of essential hypertension, and that accordingly the higher readings should receive greater weight.

The readings are averaged, as I have mentioned, and obviously there must be a limit to the number of readings. Two or three at the most is the limit. Otherwise the statistical average will wreck the classification. High readings in the past, if these are available, cannot be ignored in arriving at the rating if the rating is to be adequate. The blood pressure rating table is mathematically constructed from the basic mortality figures and arithmetically the table gives pressures such as 140/108 which are not very likely to occur in practice. The only blood pressure rule that I might quote is that apparently high diastolics are of greater mortality significance than high systolics at ages under 40. A new study of blood pressure mortality will be published probably in 1959 and if it follows the previous pattern we will find that our blood pressure ratings are slightly inadequate.

I appreciate Dr. Hamilton's comments about the public belief in the magic infallibility of the machine. The public do not have to decide between three or four different cardiologists' opinions about the same electrocardiogram. The tracings are interpreted either by an experienced Medical Director on the Home Office staff, or by a consultant cardiologist, and I should add that their opinions, favourable or unfavourable, take precedence over all others. Dr. Hamilton is only too well aware that there are differences of opinion about the significance of certain variations in electrocardiographic tracings.

Dr. Hamilton's comments on weights in non-medical applications are very much to the point, and the inaccuracies in height and weight contribute, I imagine, to the higher non-medical mortality. We do try to train the agents in the proper and accurate use of non-medical. The inspection report gives some help since the report will comment upon any unusual build.

Many companies go to a great deal of trouble to appoint and maintain a first-class examining staff. A good examiner is an asset to the Field force as well as to the Home Office underwriter but, to answer Mr. Law, while we have great confidence in our examiners we think that the external aids to underwriting such as electrocardiograms and X-rays that are used in large cases can well supplement the good work of the examiner, and the results quoted in the paper would seem to justify their use. We do not ask the examiner for an opinion of the risk.

Mr. Bateman asked about questioning the applicant as to his use of tobacco. One American study of the comparative death rates of smokers and non-smokers showed that in addition to a high incidence of lung cancer among smokers there was a high incidence of death from cardiovascular disease. The smoking habits of the applicant may therefore affect the mortality in more than one way. One large company is trying to find out something about the tobacco habits of applicants for large amounts of insurance with the idea that they may take slightly less favourable action if the case is otherwise borderline for standard insurance.

It is the borderline case which calls the art of underwriting into play. It is relatively easy to classify risks where the mortality is obviously 500% of standard. It is much more difficult to decide whether a case should be standard or Class A.

Mr. Wallace remarked upon the large amounts of insurance granted to

participants in group schemes in Great Britain. He may be comforted to learn that this liberality is not peculiar to British practice. The large amounts of group insurance available, sometimes with and sometimes without medical examination, are matters of current moment in the U.S. Certain restrictive limits on group insurance have been suggested, but except in those few states where there are strict limits incorporated in the law the limits " are more honoured in the breach than the observance." The practice has not been in effect long enough to have any definite effect on the group mortality experience although there is some evidence that the larger amounts carry a slightly higher mortality. Large amounts without examination may be granted under pension trust plans and, as mentioned in the paper, the experience on these has been favourable.

Mr. Steeds commented upon the wide variation in underwriting standards among the British offices. I doubt if there is such a wide variation in American practice, although there is deliberate and properly measured broadening of the standard class by some of the companies. Through the courtesy of one of the Canadian companies I am able to answer partly at least Mr. Steed's request for a comparison of the results of underwriting here and in the U.S. In a recent mortality study the British business showed a mortality of 90% of the comparable mortality in Canada and U.S., and there was practically no difference between the results in the last two countries. It was only at attained ages 70 and over that the British mortality was higher than the Canadian-U.S. mortality. Further, in the British experience the death rates from the following causes were higher than in Canadian and U.S. experience

tuberculosis of the respiratory system
cerebra lhaemorrhage
pneumonia
influenza

On the other hand the following causes of death represented a smaller proportion of the total British claims

diseases of the heart and circulatory system
nephritis
motor vehicle accidents.

I hope that these results do not suggest to Mr. Wallace that the elaborate methods of the North American continent are not very profitable after all.

I am glad that Mr. Wallace and some others referred to the field force. It is true that we have a considerable turnover in our Agency force in the early years of their employment, but life insurance selling is generally a full time job. I would doubt that the turnover has any appreciable effect upon the mortality. The underwriter will carefully watch the business of new agents, realising that the antiselection will arise more from poor quality of business than from deliberate attempts to defraud the company. The agent's training and experience should improve the quality of his business. The company with which I am connected emphasises quality business as being good for the company and good for the agent. We also try to get to know as many of our field force as possible and to tell them what we want in the way of business as well as to find out what are their particular problems. Mr. Bateman asked about field consideration in handling large and important cases. The burden of my paper has been consistency in underwriting, and we try to achieve such consistency. On the other hand, a good agent who is consistently submitting good quality

business should properly get a break in the occasional case where the art of underwriting comes to the help of the classification system and where the final decision is a matter of underwriting judgment. Such a practice, I should add, does not reduce a Class B case to standard. The decision would go the other way in the case of an agent who submitted a poor grade of business. We do try to make clear to the field why we are taking adverse action where such is necessary and in this I might add we are following the precepts of Mr. Lewis Orr.

The use of an underwriting manual should lead to consistency within the office, not among offices, as Mr. Lucena suggests. All underwriting manuals need not be the same although the basic mortality values for the commoner impairments such as build and blood pressure would be about the same since they are derived from the same statistical material. The extra premiums, however, can differ, since these are a matter for the individual office. Actually the use of a manual will enable an office to gauge more accurately how wide its standard range can be since they have a definite measurement. Mr. Lucena's reference to family history is pertinent and I would refer him to the Impairment Study 1951 where there is an experience on cases with a family history of cardiovascular renal disease. In this group were included cases where there were two or more deaths in the family under age 60 from cardiovascular renal disease, and the mortality ratio in the standard class was 141% of the expected. The question is further discussed in a paper by Mr. A. P. Morton in *T.A.S.A.* Volume 7, page 391. Debits for adverse family history are usually included in any underwriting manual.

I would like to thank the Faculty for giving me the opportunity of presenting this paper, and to again thank those who contributed to the discussion. I hope I have been able to convey some of the fascination of underwriting as a daily occupation and to conclude I would like to quote the apposite words of your guest Mr. Wood : " In underwriting it might be said that accuracy was the first resolve of the unimaginative and that consistency was the ultimate resort of the experienced."