

THE EFFECT OF SCHEDULE AND EXPERIENCE RATING
ON WORKMEN'S COMPENSATION RISKS IN
NEW YORK.

BY

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The actuaries and underwriters who have prepared the present classifications and rates in the New York Compensation Manual have failed to take into account a very important factor essential to an accurate formula which may be used as a basis for rate calculation. I am referring to the factor which represents the influence of schedule rating on the ultimate premiums to be collected by the companies from their assured. The New York Compensation Manual has now become the basic manual for a number of states where compensation laws have been adopted. This fact enhances the importance of the consideration which should be given to each element of the rate formula. The factor representing schedule rating has been ignored for various reasons enumerated below.

First: The actuaries were engaged in the task of preparing average rates. The schedule rating system under discussion provides debits for imperfect and credits for perfect conditions. It was alleged that the volume of increased premiums above manual rates would be equal to the volume of decreased premiums below manual rates. That was the theory upon which a schedule was established and the underwriters were justified apparently to act upon that theory and to establish rates which did not take into account the probable increase or the probable decrease in premiums resulting from schedule rating. The theory that schedule rating will produce a volume of premiums above manual sufficiently large to offset the volume of premiums below manual has been entirely shattered in practice, as may be seen from the tables exhibited in this paper.

Second: The men engaged in preparing the manual were widely divided in their opinions on the main factors of the rate formula; on the values to be attached to the various types of injuries in the accident frequency columns; on the value of the incompleting experience for outstanding claims and on the value of the law differential for the greater benefits provided by the New York statute over

that of Massachusetts. The probabilities of error in any one of the items stated were so great, and the values finally determined, by the process of analogy and judgment rather than by the exact and scientific process of mathematical calculation, so speculative in character that the omission of an important but doubtful factor was not considered in the discussion as endangering the final result.

Third: The paucity of available material in the form of statistical data and the absence of reliable judgment due to the youth of the schedule rating system in this country, made it practically impossible to determine a correct or nearly correct factor.

Fourth: From the viewpoint of the safety engineer it is not necessary to modify the formula by providing a factor for schedule rating. The argument presented is to the effect that the schedule rating system produces individual rates which reflect the true hazard of the risk and that, therefore, an increase or decrease in the average manual rates for the given classification is decidedly improper. When you point out to this ardent advocate of schedule rating the fact that the system has reduced the average rates to the extent of 12 per cent., you will probably meet with the reply that we have either started out with a manual of rates for risks of an inferior and not average type, or else that employers in this state have been so stimulated by the prospect of reduced premiums as to equip their establishments in the brief period since the introduction of schedule rating system with standards of safety, so as to reduce the accident hazard in true proportion to the resultant premium reductions.

Rate-making for compensation insurance is now under the close supervision of several important states. Things which were ignored in the past will be required to be accounted for in the future. Rate-making bodies will be put on their defence to justify their rates by data in the shape of statistics, sound judgment and analogies of hazard. With the accumulation of experience, statistical data will be required to a greater degree than heretofore. Judgment rates, found in abundance in the present manual, will be gradually superseded by rates founded on statistical information. All the component elements which enter into rate-making and all the important factors which influence final premium results, will have to be carefully considered and analyzed and brought into the formula required by insurance companies and state departments for the construction of adequate rates for compensation insurance.

Results in New York.—A schedule rating system has been adopted in this state and put into effect in July, 1914. The system has been applied through a central organization known as the Compensation Inspection Rating Board. This organization, which is a voluntary association of forty insurance carriers, has inspected and rated 20,776 risks up to April 1, 1915.

The general results of such inspections and ratings are shown in the following table.

TABLE A.

Number of risks	20,776
Estimated premium manual rates	\$ 5,437,632.63
Total premium increase	93,468.92
Total premium decrease	768,116.06
Net premium decrease	674,647.14
Per cent. of decrease	12.41
Payroll amounts to	\$453,829.871.00

Statistical information has been tabulated by the board from units representing individual risks, and assembled in groups according to classifications. We are thus enabled to analyze the effect of inspection and rating for each classification. The value of the information is enhanced by the fact that the system was applied by an impartial body under uniform rules and methods. Analysis of results in important classifications is reproduced in the following table:

TABLE B.

Classifications.	Estimated Payroll.	Manual Rate.	Premium at Manual.	Premium at Schedule.	Reduction.	Increase.	Per Cent.
Aluminum smelting works.....	\$ 1,116,000	2.66	29,685.60	25,066.60	4,619.00		15.52
Artificial leather and flower mfrs.....	1,055,167	.36	3,333.43	2,884.09	449.34		13.47
Automobile mfr.....	7,323,170	1.10	80,560.30	59,335.94	21,224.36		26.34
Bakers.....	3,878,209	1.72	66,705.04	66,569.97	135.07		12.92
Bookbinders.....	1,151,184	.49	5,640.88	4,748.82	892.06		15.81
Boot and shoe mfr.....	7,830,596	.39	30,539.34	25,044.11	5,495.23		14.71
Box mfr.—solid paper boxes, etc.....	954,575	2.49	23,769.54	21,256.32	2,513.22		10.57
Brass goods mfr.....	1,484,167	1.36	20,193.22	18,153.89	2,039.33		10.09
Candy mfrs.....	602,627	1.46	8,797.96	7,622.62	1,175.34		13.83
Canneries—no can mfg.....	1,560,471	1.78	27,687.60	26,707.38	980.22		3.54
Cigar mfr.....	1,022,300	.39	3,986.97	2,903.93	1,083.04		27.16
Cigarette—cigar mfr.—machine made.....	676,749	.49	3,315.83	2,764.45	551.38		16.62
Clothing mfr.....	38,114,656	.36	137,212.92	119,578.75	17,634.17		12.12
Collar and cuff mfr.....	1,126,052	.31	3,491.53	3,131.21	360.32		10.31
Copper refiners—no ore reduction.....	1,146,492	2.66	30,504.84	32,509.28		2,004.44	6.57
Corset mfr.....	1,136,756	.36	4,095.00	3,390.03	704.97		17.21
Dressmakers.....	1,428,642	.36	5,142.96	5,242.05		99.09	1.92
Electrical apparatus mfr.....	941,918	1.13	10,643.47	8,955.46	1,688.01		15.85
Elevator mfrs.....	753,300	1.94	14,604.02	12,045.31	2,558.71		17.52
Fur goods mfr.—no preparing of skins.....	1,087,022	.36	3,913.20	3,088.92	824.28		21.06
Furniture mfg.....	1,607,892	1.46	23,475.34	20,353.41	3,121.93		13.37
Jewelry mfr.....	928,449	.65	6,045.54	5,112.22	933.32		15.43
Knitting mills.....	2,498,631	.75	18,739.50	16,542.04	2,197.46		11.72
Knitting mills from cop yarn—no yarn mfg.....	2,180,735	.65	14,041.74	12,950.01	1,091.73		7.77
Laundry—N.O.C.....	2,295,563	2.92	67,031.52	60,232.97	6,798.55		10.01
Leather wearing apparel and novelties.....	952,547	.65	6,191.25	5,274.66	916.59		14.80
Machine shop—no foundry.....	4,108,076	1.36	55,870.16	50,198.58	5,671.58		10.15
Machine shop—foundry.....	976,958	2.07	20,223.90	17,664.64	2,559.26		12.85
Millinery mfr.....	1,320,382	.36	4,753.44	4,633.34	120.10		2.52
Necktie mfr.....	836,326	.36	3,011.03	2,627.09	383.94		12.75

Classifications.	Estimated Payroll.	Manual Rate.	Premium at Manual.	Premium at Schedule.	Reduction.	Increase.	Per Cent.
Newspaper publishers	\$ 3,094,761	.65	20,089.43	15,670.11	4,419.32		21.99
Perfumery and flavoring essence mfr.	234,175	.81	1,897.02	1,665.17	231.85		12.22
Piano mfrs.	994,150	.68	6,756.85	5,810.18	946.67		14.01
Planing and moulding mill	872,522	3.43	30,126.75	28,695.02	1,431.73		4.75
Printers	6,900,435	.97	66,933.88	55,254.30	11,679.58		17.44
Pump mfr.	865,700	2.07	17,925.03	14,375.86	3,549.17		23.16
Shirt mfr.	1,325,784	.31	4,109.98	4,390.94		280.96	6.86
Spinners	1,086,800	.78	8,487.04	6,957.67	1,529.37		18.02
Woolen spinners and weavers.	2,388,758	.78	18,633.02	15,996.56	2,636.46		14.15
Total	109,858,697		908,166.07	795,403.90	115,146.66	2,384.49	12.42

Prominent classifications with an analysis of risks that have received net credits of from 5 per cent. to 30 per cent., segregated in six groups, in accordance with the extent of credit allowed are shown in the following table:

TABLE C.

Classification.	Rate.	No. of Risks Receiving Deductions.						Total.
		0-5 %.	5-10 %.	10-15 %.	15-20 %.	20-25 %.	25-30 %.	
Art. feather and flower mfr. ....	.36	2	4	10	9	20	6	51
Bakers.	1.72	31	94	71	24	7	2	229
Bookbinders. ....	.49	2	4	2	12	34	5	59
Boot and shoe mfr. ...	.39	1	3	3	10	22	7	46
Bottlers—under pres- sure.	4.05	17	18	14	4	2		55
Box mfr.—solid paper boxes.	2.49	16	15	21	5	7		64
Canneries—no can mfg.	1.78	9	11	13	4	3	2	42
Carpenter—shop only	2.01	6	16	20	8	6	1	57
Carriage and wagon mfr.	1.10	4	17	14	9	13	1	58
Cloak mfr. ....	.36	2	4	6	12	32	5	61
Clothing mfr. ....	.36	76	118	125	184	566	143	1,212
Dressmakers. ....	.36	1	5	5	5	26	10	52
Fur goods mfr. ....	.36	2	3	11	17	53	15	101
Furniture mfr.	1.46	9	19	20	13	11	3	75
Glove mfr.—leather .	.39	1		6	7	18	9	41
Jewelry mfr. ....	.65	2	7	17	11	28	5	70
Knitting mill—no yarn. ....	.65	6	3	11	14	18	7	59
Laundry—N.O.C.	2.92	27	32	45	17	8	2	131
Leather wearing ap- parel and novelties	.65	2	6	10	7	24	4	53
Machine shop—no foundry.	1.36	30	35	51	36	30	8	190
Millinery mfr. ....	.36	3	4	3	2	30	3	45
Necktie mfr. ....	.36	1	3	4	1	21	9	39
Newspaper publishers	.65	2	1	5	2	24	6	40
Planing and mould- ing mill.	3.43	5	13	11	8	4		41
Printers. ....	.97	30	47	68	101	110	25	381
Total.		287	482	566	522	1,117	278	3,252
Per cent. of total risks		8.9%	14.7%	17.4%	16%	34.6%	8.4%	

Prominent classifications where the inspections have resulted in increased rates arranged in six groups, according to the size of debits, ranging from 5 per cent. to 30 per cent., are shown in the following table:

TABLE D.

Classification.	Rate.	Number of Risks Paying Excess Rate of						Total.
		Rate of						
		0-5%	5-10%	10-15%	15-20%	20-25%	25-30%	
Bakers.....	1.72	9	6	2	4		4	25
Bottlers—under pressure.....	4.05	3	2	4			2	11
Canneries—no can mfg.....	1.78	3	3	2	2	2	3	15
Carriage and wagon mfr.....	1.10	5	4	3		2	8	22
Clothing mfr.....	.36	50	61	29	37	18	100	295
Dressmakers.....	.36		2	2	3	1	3	11
Hat. mfr.—not straw.....	.39	3	3	3		3	4	16
Ice cream mfr.....	1.72	4	2	4	1		4	15
Knitting mill—no yarn.....	.65	2	1	1	1	2	9	16
Laundry—N.O.C.....	2.92	12	6	5	3	1	7	34
Machine shop—no foundry.....	1.36	11	9	8	4	3	19	54
Planing and moulding mill.....	3.43	6	8	3	4	4	4	29
Printers.....	.97	16	17	4	4	3	7	51
Saw mill.....	5.99	5	11	6	2	4	7	35
Shirt mfr.....	.31		1	1	1	3	5	11
Total.....		129	136	77	66	46	186	640
Per cent. of total risks.....		21	21.3	12	10.3	7.2	29.2	

You will observe that the results of the application of the system show quite conclusively that the advances above manual are comparatively unimportant, while the reductions below manual are substantial and will have a marked effect upon the net volume of premiums to be collected from the companies by the assured.

Furthermore, account must be taken of the fact that the education of employers as to methods for reducing premiums is growing apace and that there is a tremendous pressure exerted by companies and their agents to enhance the credits, so as to make the insurance more attractive to the employer. These facts and tendencies will undoubtedly result in still greater premium reductions on future ratings.

An Ideal Basis for a Schedule Rating System.—Practice and observation leads me to the conclusion that the distribution of credits and debits in the present rating system are not ideal and that it is possible to so modify the system as to provide a more equitable distribution which will be better from a theoretic as well as from a practical standpoint.

Three systems of applying debits and credits are possible. First, a system based upon an inferior plant; that would provide all credits. Second, a system based upon a superior plant and pro-

viding all debits. Third, the present system based upon an average plant and providing both debits and credits. The first plan possesses a disadvantage in the fact that the starting point is a high manual rate, difficult to inaugurate after the employer has been educated to the point of accepting a lower basis. Furthermore, under a plan of that kind, an employer will frequently receive quite undeservedly credits to which he is not entitled. The second plan is probably the most scientific of the three enumerated but has been so far regarded as impractical from the viewpoint of the underwriter and the agent, who are obliged to justify definite increases in rates to the assured. A solution is suggested here which may be effected by a combination of the good points involved in the first and the second plans and adhering at the same time to the principle of a schedule founded upon a superior plant.

The plan proposed is as follows: The present schedule rating system is divided into two parts. First, physical hazard for which charges and credits are specific. Second, moral hazard for which charges and credits are discretionary. I believe that a clear distinction may be drawn between those two divisions and the application made as follows:

Begin at a point which is equal to 80 per cent. of the manual rate, that represents a plant physically perfect. Under our present practice we allow 20 per cent. from manual rate for physically perfect plants; therefore, a rate representing 80 per cent. of the manual stands for a physically perfect plant. Build a system of charges upon that foundation subject to no limitation of any kind. This will enable the employer to get on his rating form a clear conception of the debits for physical conditions and will place him in a position where it is possible to correct his plant in a manner to enable the rating body to remove charges for the defects as shown in the inspection report. If a plant is physically perfect, no charges are imposed and the 80 per cent. represents automatically the rate for physical conditions. This will remove all possibility of the argument which has heretofore been presented, that once an employer receives a credit of 20 per cent. under the present condition, all incentives for correcting conditions are removed, no further credit being possible. It will also remove the charge that an employer receives credits undeservedly for items which do not represent any real hazard. For the element of moral hazard embodied in the discretionary features of the schedule and for experience sub-

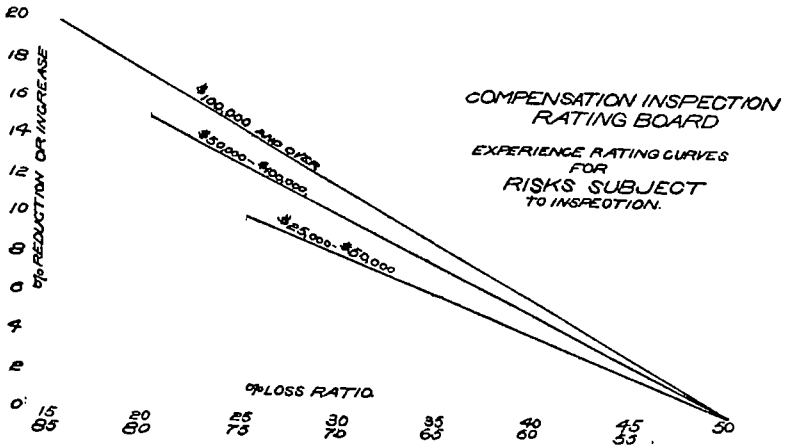
mitted in support of the moral hazard, the system of debits and credits may be retained to good advantage.

An amendment of our schedule rating practice on the lines suggested here, may be brought about without any serious disturbances and without any violent fluctuation of conditions as they exist. The ideas suggested here are not revolutionary and may be applied without any serious friction. It is possible that the application of this method of rating will bring about a greater number of risks subject to rates above manual.

Much has been urged against advanced rates as unwieldy and unpopular. I would not suggest, however, that the rating practice should be so amended as to wipe out advanced rates. It is quite true that they are unpopular, but at the same time they offer the strongest possible incentive for correcting existing defective conditions. The companies, agents and assured are thoroughly awake to conditions only when an advanced rate is promulgated. If the reasons for the advanced rate are sufficiently clear, it is then possible to induce the employer to use all the powers at his command to correct the conditions which have produced the charges. The system proposed herein will so clearly show all charges for physical conditions that the employer will have at his command a detailed rating form indicating a charge for every defective item.

Experience Rating.—There is a division of opinion among underwriters and actuaries as to the wisdom of applying individual experience in the rating of compensation risks. The subject is growing in importance and bids fair to take a prominent place in the schedule rating of compensation risks. As applied in the office of the rating board, individual experience is used as follows:

Risks subject to inspection include the extensive group of manufacturing classifications. The experience application submitted by the company gives an analysis of accidents divided according to nature of injury. A schedule of valuation has been adopted for each type of accident. The valuation produces a theoretic pure premium for the risk, which is converted into terms of a loss ratio by comparison with manual rates. A chart has been adopted (shown in illustration 1) providing debits and credits applicable in accordance with the loss ratio produced by a valuation of the experience.



Risks that have been rated on basis of inspection and experience show following results:

TABLE E.

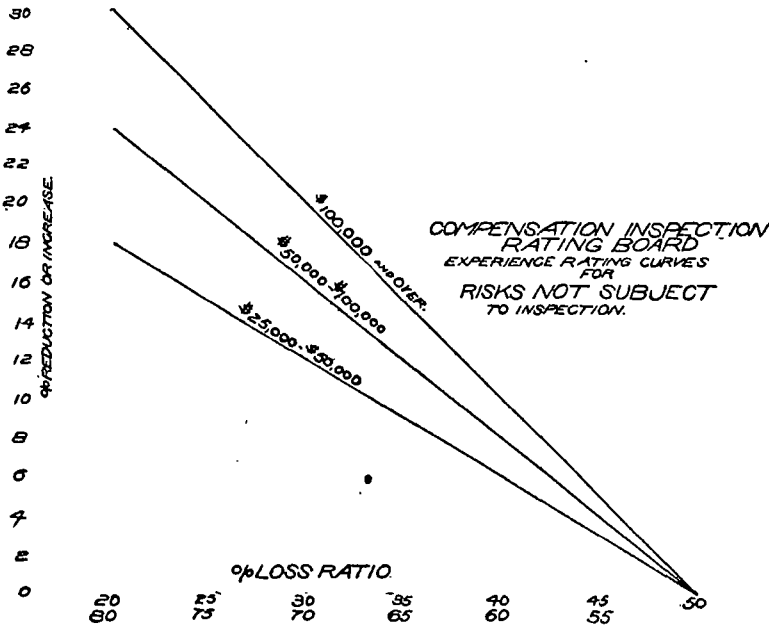
Number of risks	550
Estimated premium manual rates	\$577,461.45
Total premium increase	2,136.28
Total premium decrease	111,002.03
Net premium decrease	108,865.75
Per cent. of decrease	18.85
Payroll amounts to	\$33,594,738.00

The formula for application of experience on inspection risks is as follows:

To the manual rate add result of physical rating and one-half the algebraic sum of discretionary and experience ratings, viz., $M.R. + P.R. + \frac{1}{2} (D.R. + E.R.) = \text{Schedule Rate}$.

It is to be noted that on inspection risks experience is used only as a guide in determining the extent of the discretionary charges or credits to be applied under the heading of Safety and Welfare and General Order.

Risks not subject to inspection include largely the group of contracting risks for which an inspection schedule does not appear to be practical. Experience is used as a sole method for departure from manual. The method for determining the extent of departure is the same as used for inspection risks, subject, however, to different limits, as shown in illustration 2.



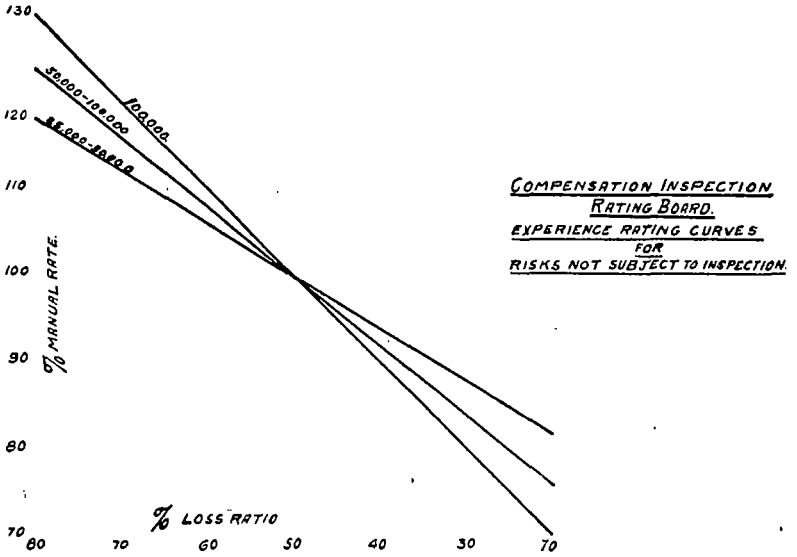
The following table shows the results of rating on basis of experience:

TABLE F.

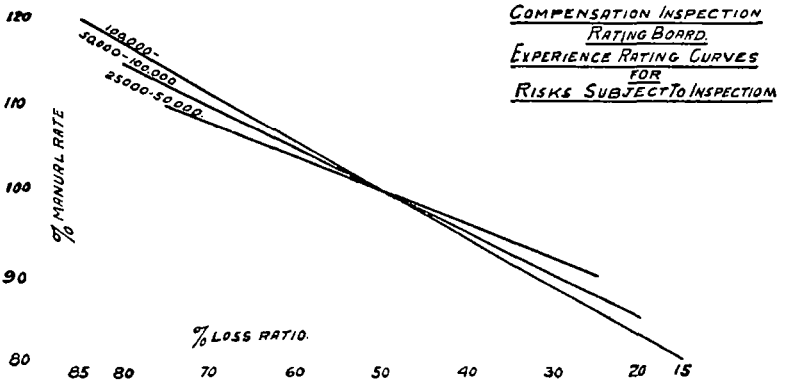
Number of risks	230
Estimated premium manual rates	\$321,068.98
Total premium increase	473.91
Total premium decrease	78,191.70
Net premium decrease	77,717.79
Per cent. of decrease	24.21
Payroll amounts to	\$10,146,025.00

The general tendency is to make experience applicable only to such risks as show a favorable record. That seems to be the weakness of the system. The idea which was advanced previously in connection with the schedule rating practice, may be applied with equal logic to the experience rating system, viz., beginning at a point which is equal to 80 per cent. of the manual rate, apply the accident experience as a system of debits under certain limitations (see illustration 3).

With the development of experience under compensation insurance, many of the valid objections now urged against the experi-



ence method will be eliminated per se. Accident frequency and loss payment records on individual risks of a reliable character will become available to the rating office and should prove an important guide in the determination of the proper rate.



The probabilities are very strong that the companies will in the future resort with increasing frequency to experience as the true standard for measuring the hazard and fixing the rates for manufacturing as well as contracting risks.

Accident Prevention.—Aside from the effect which schedule rating has produced upon premium rates for compensation insurance, the important question, from a humanitarian point of view, is whether the system has contributed to any degree in reducing the number and severity of accidents in industrial establishments. The vindication of the system will be complete if it can be demonstrated by facts and figures that accidents, preventable by the installation of standard equipment, have been avoided through the adoption of measures for the protection of the workers. While figures demonstrating the beneficence of the system are not available as yet, in these early days of compensation, information received from all parts of the state indicates that the employers are taking a lively interest in schedule rating, that they are eager to learn and to put into effect methods which will guard the operation of dangerous equipment and result in the prevention of unnecessary accidents.

Evidence is not wanting that the system has given a tremendous impulse to the propaganda of safety ideas, to the organization of safety committees and to the exercise of greater care and caution in the operation of dangerous equipment.

Safety engineering as a profession has become of real importance with the adoption of compensation laws and schedule rating systems. Employers, faced with the problem of high rates, welcome the opportunity to secure reductions through compliance with reasonable requirements for protection of employees.

To the close observers of conditions there is no doubt left that employers are interested and recognize the possibilities that may develop as a result of a perfected system of schedule rating. If in addition to convincing the practical employers and business men of this state as to the inherent virtues of the plan, it can be successfully demonstrated to the members of this society that the application of the plan will eventually reduce the number of accidents and the extent of losses under compensation, the triumph of the idea will be complete.

As soon as the reports of the experience for the first compensation year have been tabulated, sufficient facts may be marshalled to indicate the effect of schedule rating, not only on premiums, but what is more important, on the accidents and losses sustained in the manufacturing plants subjected to schedule rating.

It will be gratifying to the writer if the discussion that may follow the reading of this paper will develop opinions and ideas to-

wards the solution of the questions presented: (1) as to the need of modifying the future rate formula, (2) as to the value of experience as a factor in schedule rating, (3) as to the manner of conducting research to establish the influence of schedule rating on accident frequency and (4) as to the best plan leading towards an ideal schedule.