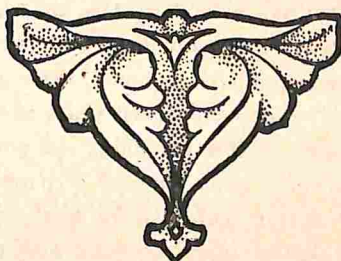


Temperance Addresses

Industrial Phases of the Alcoholic Question

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EDITOR'S NOTE

The following pages reproduce three sections of a monograph of some 240 pages on **The Use of Alcohol and Industry**. The author, who is not only a physician, but holds a doctor's degree in political economy, made the studies reported in the volume about a dozen years ago. In addition to the topics treated in this pamphlet, the author discussed the influence of alcohol upon physical and mental work, the effects of its use during and between work-hours and after work, the causes that lead to drinking and economical effects, the treatment of alcoholism. The data and conclusion of these sections of Dr. Stehr's work have been translated and published here, partly because they are of interest in themselves, although referring to industrial conditions in another country, and partly in the hope that they will suggest observation and inquiry along similar lines in the United States.

It will be observed that Dr. Stehr is not disposed to be dogmatic in his interpretation of data, and frequently cautions against attributing certain conditions wholly to alcohol without considering other factors entering into the problem, but his conclusions, if not final in all respects, are nevertheless, suggestive and ought to stimulate further study of the important economic and industrial questions involved.

Part I.

THE EFFECT OF ALCOHOL UPON PRODUCTIVITY

THE use of alcohol in the evening will show a damaging effect the next morning, not only when a person in the best of health, working to the limit of his capacity exceeds a certain amount, but also when a weak or over-fatigued workman limits himself to quantities that are generally held to be rational. This amount, called moderate, can no longer be considered from the standpoint of economics. In both cases, the body does not have sufficient time to recover as it should during the night from the fatigue of the preceding day's work, because this process is rendered difficult by the necessity of eliminating the foreign substance, alcohol. For a man who is wearied by his day's labor, but whose strength would be restored by a night's rest, a quantity that is currently called moderate is sufficient to disturb his equilibrium. He feels, next morning, as if he had not slept enough and he has no desire to work. Unless compelling considerations drive him to work, he will yield to his urgent need and give his body more rest. He will, therefore, be late to his work, or absent from it. If he is already an alcoholic, he will drink again. At the beginning of the week and after pay-day, this effect will be most noticeable.

The workman himself does not deny that the feeling of flabbiness on Monday with the ill-humor that is peculiar to him is to be set down to this use of alcohol on Sunday. The contractor, as well as the foreman, is not in doubt for an instant what reason to give for the distaste for work on Monday in men who show no trace of it when sober.

Fatigue from loss of the night's rest by sitting in the beer-house is also to be charged up to the account of alcohol, for the disposition to the exhausting and long-continued sitting in the beer-house, often for half the night, is a practically inseparable accompaniment of alcohol. Only by the general consideration of it can we understand the far-reaching effect of even the moderate use of alcohol which must be correspondingly longer and stronger upon an exhausted and, therefore, unresisting body in muscular repose.

In view of the considerable injury which the industries of the Rhine suffer from the absence of the workmen after the frequent holidays, an investigation by the Industrial Union was directed to ascertaining the number of absences on work days in the separate industries.

Unfortunately the whole material is not suitable for our purpose, because it includes the days on which the workmen participate in festivals that fall upon working days. Only a few factories furnish details suitable for our purpose.

Investigations of Monday Absences

A sugar factory in Cologne, with about 230 workmen, has had constantly about 7 per cent of absences on Monday, whether festivals were celebrated or not. A machine factory in Sürth, with about 400 workmen, has a loss of from

8 to 10 per cent. But that alone does not show the full extent of the injury in both places. A number of the workmen do not appear until Tuesday, and then not to work, and many factories report that they can not count on having all their workmen together until Wednesday or Thursday.

Evidently the conditions in the Cologne district are so exceptionally bad that one must avoid generalizing from them. The same complaints, however, are not lacking in other sections, even if they are less frequent.

In order to secure a definite basis I take the figures of the absences of workmen after Sundays and holidays in a hemp-spinning house in Cologne for one year, and for comparison, another week day, Thursday, because, according to common experience the smallest number of absences in the course of the week falls upon the latter day. According to careful inquiry, the absences in this factory on Monday amount to 4.77 per cent of the whole number of workmen; on Thursday to only 1.44 per cent.

The report of a quarrying firm in Moravian Austria, according to official figures obtained by Dr. Wlassak for the Vienna Congress against alcoholism, gave the following result:

	1898	1899
Absences on the usual week days	5 per cent	6.89 per cent
Absences on days following Sundays and holidays	7.49 per cent	9.29 per cent
Absences on days following advance pay-days ..	8.90 per cent	10.37 per cent
Absences on days following regular pay-days	10.36 per cent	12.88 per cent
The difference here amounts to from 2.4 to 6 per cent.		

According to figures obtained by Asmussen in a Hamburg shipyard during the month of July, 1898, the difference between the absences on Monday and those of other week days on which there were the fewest, amounted to from 2.4 per cent to 5.3 per cent of the total working force. The same conditions in relation to tardiness on Monday were shown by an account kept in a Hamburg machine shop in March, 1899.

At a meeting of the Rhine industries at Cologne (October 15, 1898) to consider the damage done by the frequent "celebrations" of the Rhine workmen, the representative of the Bochumer Chamber of Commerce reported that there had been shortage of 6,500 tons in his district as a result of "Blue Mondays;" on days after pay-day, of 4,300 tons. If, for example, 120 men are absent from a quarry, it is scarcely possible to fulfill the requirements for safety, or to carry out the police regulations and fill the individual places.

Where the Loss Falls

The direct economic damage growing out of this falls, first of all, upon the workman. Loss of wages on account of absences and the penalties for remaining away without excuse are, however, a loss that appears to the workman to be of not much account; he regards it as a part of the increased cost of a pleasure that he cannot do without. More sensibly hit are his associates on the same job who come to work, but because of the break in continuity through his absence are also obliged to take a holiday. The economic losses occasioned by Sunday dissipation are felt less keenly by the workmen than by the contractors who have no compensating equivalent of pleasure. Their losses are the heaviest where groups of workmen are all compelled to lose time through the absence of one man, especially when it is a matter of skilled labor, which can

not be easily replaced. Special complaints in this respect were made by a jute spinning-mill, a cotton factory, a wall-paper factory and a chocolate factory. Not infrequently such factories must run on Monday at a loss. In other cases where absences affect production only, the loss to the industry is not so great, but is yet considerable and must correspond to the figures given above—from 3 to 5 per cent of total output.

My efforts to obtain concrete examples to show how high is the loss of labor at the beginning of the week from Sunday drinking, met, as was expected, much difficulty. In all kinds of branches of industry I heard the most various estimates as to the quantitative or qualitative falling off on Monday. In a Cologne glass factory, a gray-haired foreman estimated the decrease at 16 per cent, but the figures necessary for a precise judgment appeared to be unobtainable. Finally I was able to obtain reliable statistics, which give a clear picture of the effect of the Sunday use of alcohol.

The figures of tables I and II show the day's production of laborers in a mine in the Black Forest; it is the running meter of excavated stone measured by auger holes. The work demanded the same amount of strength and the same small measure of intelligence. Table I is taken from the records of five workmen who were designated as drunkards, and because they were soon discharged I was only able to obtain their records for one week. The other five were called "average" workmen; that is, in spite of the relative amount of their work (3.8-4 meters daily) they left much to be desired.

TABLE I. The Work of Heavy Drinkers in a Black Forest Mine

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Workman A	1.6	2.4	2.2	2.4	2.6	2.5
Workman B and C.....	3.	3.6	4.	4.5	4.2	6.2
Workman D and E.....	4.	4.5	4.4	4.8	4.8	6.4

We see that with the drunkards A-E, the working ability was the lowest on Monday and steadily advanced, although not regularly, to the end of the week, when it was so high that on Saturday B and C did 100 per cent more than on Monday, and A, D and E did 50 per cent more.

TABLE II. The Work of Average Workmen in the Black Forest Mine

Average running meters of coal mined per day in 29 days:						
Workman.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
F	38.54	42.38	41.63	39.92	38.73	39.95
G	44.22	47.77	48.62	48.68	47.86	46.69
H	38.52	41.17	42.17	41.65	41.32	41.04
J	36.15	36.72	36.05	36.62	37.60	38.50
K	23.85	27.20	26.83	27.80	27.87	28.67

In this other group, the "average" workmen, F-K, we find also Monday's work the lowest, when one would expect it to be, after a day of rest, the highest. Yet the difference here is not so striking; the average for the other week-days amounts to only from 2.53 to 13.38 per cent more than Monday's. We also, surprisingly, find Saturday to be the most favorable working day in the case of J and K, two workmen who take the lead for the average for the week (10.08 and

10.14 running cubic meters, respectively). They also show a constant improvement during the week, and as with the drunkards, the greatest efficiency on Saturday, from which it is to be concluded that they, too, suffer from the effects of irrational enjoyment on Sunday. Their larger averages for the week might be attributed to their greater physical strength and dexterity.

The workers F, G and H have their best working days on Tuesday, Thursday and Wednesday, respectively. An explanation of this is not easy, because the sporadic increase in the use of alcohol by these workmen during the week, which in these regions belongs to the evils called unavoidable, can not be registered. I confine myself, therefore, to bringing forward the fact, for us important and established, that in spite of the heavy muscle work exacted of these men, Saturday is not the day on which they accomplish the least, as might be expected on account of the fatigue, but on the contrary, in every case, Monday's work is more or less inferior. In other words: The day of recreation is more fatiguing for them than a work day.

Less Machine Power Used on Mondays

These statistics of heavy work in a Black Forest mine I now contrast with the figures which the optical workshop of Karl Zeiss in Jena, obtained at my suggestion, and with their well-known willingness to aid the solution of social questions, placed at my disposal. They reckoned the use of the current for turning the machines in "kilowatts," for the separate days of the week from April 1, 1900, to April 2, 1901, and obtained the following figures:

Monday435 kilowatts (8 hours)
Tuesday440 kilowatts (8 hours)
Wednesday438 kilowatts (8 hours)
Thursday442 kilowatts (8 hours)
Friday463 less 27.2 equals 435 kilowatts (8½ hours)
Saturday414 plus 27.6 equals 441 kilowatts (7½ hours)

The strikingly larger and smaller amount of current used Friday and Saturday, respectively, is due to the fact that on these days the men worked, not eight hours, as usual, but eight and one-half hours on Friday and seven and one-half on Saturday. If we compute the current used on these days at the normal rate, we get a series which shows the most work done on Thursdays and Saturdays and the remainder of the week is here only 1.03 per cent. The firm is inclined to regard this tolerably constant efficiency during the week as due to the eight-hour day, which allows time for complete daily recuperation. This conclusion is derived, therefore, from the supposition that when the working day is longer, the fatigue of the day is not sufficiently counterbalanced by the night's rest and hence must culminate at the end of the week. This is not particularly indicated, however, by the Zeiss figures, as in that factory only as much strength was used as could be comfortably made up during the succeeding rest period, while, according to experience, even severe demands upon bodily strength can be fully compensated if the time for rest is properly spent.

One must rather conclude that, chiefly as a result of the average high intelligence of the men engaged in this industry and in consequence of the welfare institutions in Jena, the enjoyments there move in regular rational ways, by which constancy of the efficiency seems to be best safe-guarded.

The fact that even here the smallest amount of work is done on Monday leads us, in view of the well-known solidarity of these workmen, to the conclusion that the slight sinking of the curve on Monday is to be attributed to the slackening which experience shows so often accompanies the feeling of disinclination for taking up again, after a longer or shorter intermission, a daily task more or less monotonous and in any case made compulsory by "dire necessity."

We must, therefore, refrain from attributing the frequently large deficit of work on Monday entirely to irrational Sunday pleasures, and must not forget to make always some, even though small, allowance for the feeling of disinclination toward resuming work on Monday. On the other hand, one must not ascribe without question, the gradual increase of working ability toward the end of the week to the gradual disappearance of a heavy alcohol intoxication.

Doubtless the effect of practice is a not unimportant consideration in many cases. This would be one explanation for the large efficiency of Thursday—with considerable individual variation—in the Zeiss figures.

Unfortunately I lacked the material for determining precisely the extent of these factors. The strikingly lower rate of Friday is undoubtedly explained by the fact that the usual working time was prolonged and the interruption of habit diminished the intensity.

The higher output on the last day of the week may be due to the desire of the workmen to increase as much as possible the amount of wages they were to receive on Saturday. In the case of those who used larger quantities of the alcohol, the increase of work toward the end of the week may be due to the fact that after an intoxication beginning on Sunday or Saturday evening, which affected pre-eminently, as we know it does, the finely organized nervous system, the muscle strength which before was regulated by that system is not fully restored until the nervous system regains control.

The Zeiss explanation of their material contradicts at least the observation of other manufacturers.

A button factory in Freiburg has not found toward the end of the week lack of attentiveness, smaller working ability or other appearance of cumulative fatigue. These appear, according to the report of the observant superintendent of this factory, only when the workmen with large families do other outside work until 12 or 1 o'clock at night. It is noticeable that besides the effects of alcohol, both the amount, and especially the quality, of work are influenced by mental irritation, care and anxiety.

A third set of statistics of the amount of work done on the separate days of the week, but unfortunately extending over only a few weeks, was furnished me by the umbrella frame factory near Cologne. The steady, uniform work consisted, with all four men, in the monotonous soldering of iron rods over a coal fire and required no particular intelligence or manual dexterity. The upper part of the body and face were kept pretty warm by heat.

TABLE III. Average Daily Number of Rods Soldered by Four Workmen in an Umbrella Factory in Cologne—Computed for Four Weeks

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Workmen	257.08	256.03	264.02	279.40	239.84	190.24
O: Habitual Drinker	261.60	319.50	330.10	352.30	279.81	188.85
W: Easily persuaded to drink	333.25	350.10	324.20	341.30	297.00	224.58
G: Steady	260.94	305.07	283.70	329.50	316.34	235.58
C: Steady						

The smallest average number of pieces done per hour falls in all cases on Saturday. The explanation, according to information from the factory, is that the men begin earlier to look after their machines, and that the inclination to work is less strong on Saturday, because the week's wages are reckoned up on Friday night, and Saturday begins a new week. The highest output was on Thursday, this being in harmony with the Zeiss figures.

Workman O is designated as a habitual drinker and G and C as steady. W is a workman who is easily persuaded to drink. O and W show a gradual increase of working ability from Monday to Thursday which, without forcing the point, is to be explained by the slowly abating alcohol intoxication.

The average hourly output (for the four weeks) of drinker O is about 14.5 per cent. less than the next smallest, that of C, who is considered sober. In general, however, as already pointed out, the difference in the amount of work of two men, even though one is a drinker, is not to be attributed to alcohol without further question. Physical strength, skill, and practice, must be taken into account. Thus it is not surprising that W, a particularly strong appearing man, would average the same as C. The greater physical strength counterbalances, in this simple mechanical work, the damage done by alcohol. Only G, the best workman reached his highest efficiency on Tuesday.

That G and C also called sober, should likewise show a falling off on Monday must be attributed to the previously mentioned disinclination for returning again to monotonous labor.

From a weaving firm in Baden where I also instituted investigations, it was reported to me that the difference between the working ability of Monday and other days was scarcely noticeable. It existed with only a few men, while many of the married men, and women also, did more on Monday than on other days. As I could not obtain figures on this point, I take it that this conclusion is not drawn from a large number of weeks but only from the comparison of the work of the separate days. If it was found to coincide with large averages, one would have to conclude from the exceptional case that here the men spend Sunday in real thorough rest, or in rational pleasures.

TABLE IV. Daily Average for Three Weeks of Five Men in a Dresden Bottle Factory

Workmen	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
I	184.6	252.3	281.1	287.6	264.6	257.
II	224.	333.	434.6	524.	539.	560.
III	365.3	436.3	442.	445.3	461.6	450.6
IV	238.	497.6	551.3	553.6	517.3	494.
V	152.	245.	253.6	227.3	273.3	248.3

Table IV gives the number of bottles made by five glass makers during three weeks. The least work in every case is done on Monday. In all cases the efficiency increases during the first days of the week, after the "rest day," and reaches its highest point, in two cases on Thursday, in two cases on Friday, and in one case on Saturday. The total output of work by the five men is about 28.5 per cent. less on Monday than the average for the other days of the week. Saturday shows only an insignificant sinking of the efficiency curve, while Tuesday still shows, on the average, a considerable inferiority. The firm explains Tuesday's record by the fact that in Dresden, on Monday as well as Sunday,

there is much public dancing to which many of the workmen are much given; only a small part of the workmen, mostly old, married people, work the same on Monday as on other days.

Table V is the work of Dr. Wlassak and is based upon an official report of a coal mining establishment in Moravian Austria. The amount of coal produced (1899) on the days following Sunday and holidays, was 3 per cent less, and after advance pay days 24.5 per cent less than on other days of the week.

TABLE V. Absenteeism on the Various Days of the Week at a Coal Mine

Days of Week	Cwt. of Coal Mined		Percentage of Absentees	
	1898	1899	1898	1899
On the usual week days	9.24	9.80	5.00	6.89
On days after advance pay-day	7.09	7.40	8.90	10.37
Days after pay-day	9.08	9.30	10.36	12.88
Days after Sundays and holidays . .	8.97	9.50	7.49	9.29

With reference to the quality of the work done on Mondays I was not able to obtain statistics. I have only the verbal reports made to me by the factory officials in substantiation of the fact that careless execution, spoiling of material, etc., which is usually ascribed to special circumstances occur, with few exceptions, only on the days following Sundays and holidays; with the women, on the contrary, this difference is scarcely noticeable.

In the five groups of figures, I to V Tables, we can not expect exactly corresponding figures for the separate week days, because they come from work of diametrically different kinds with correspondingly different working material. First, are the isolated mining works in the Black Forest, more than an hour from the next small village, with men of most inferior quality of whom rough muscle work is demanded, who neither know nor have access to better pleasures than alcohol. In Jena were found almost their antipodes: men in the most favorable hygienic conditions imaginable, engaged in a work requiring for the most part high qualities, with keen intelligence, sufficient leisure, and abundant opportunities to engage in the higher enjoyments. In the Rhineland, Cologne, was a working class required to do monotonous, purely mechanical work under externally favorable working conditions, and although better pleasures were easily accessible, they had no desire for other enjoyments than those attached to alcohol. In Dresden, the workmen were in the midst of active intercourse with the great city.

Although this statistical material will not permit us to state exactly the extent of the role which alcohol can and does play in the percentage of otherwise possible work, we may yet draw from it the following very significant conclusions:

1. Every kind of work, even that requiring only a minimum of intelligence, shows throughout the whole week the injurious influence of immoderate use of alcohol on Sunday.

2. The smaller product of Monday is not to be attributed solely to Sunday indulgence in alcohol; the physiological disinclination to begin work again and the loss of practice during the time of rest diminished productivity in a small degree, difficult to measure, and varying with the individual workman and kind of work. In order to determine exactly the damage through irrational pleasure, the factors of disinclination to resume work and loss of practice would have to

be deducted. A clue to the size of these two factors is furnished us by the differences in the Zeiss workers (1.03 per cent.).

3. The extent of the total damage resulting from Sunday indulgence may exceed, in alcohol addicts engaged in crude muscle work, 50 per cent. With workmen designated as "average" and only given to what is called moderate use of alcohol, it may amount to from 2.5-13.3 per cent. With the Dresden bottle workers it was about 28.5 per cent below the average of the rest of the week; with the umbrella workers of Cologne it varied from 2 to 23.9 per cent.

4. The more the workman is accustomed to indulge only on Sunday in the immoderate use of alcohol, the more his efficiency curve shows a steady upward direction in the course of the week; in substance, it is the expression of disappearance of the alcohol intoxication.

5. The more rational a workman is in his enjoyments, the nearer his Tuesday's efficiency approaches the maximum of his output, which is oftenest reached on Thursday, and the more constant, as a rule, is his daily working ability.

Part II.

THE EFFECT OF ALCOHOL ON INDUSTRIAL ACCIDENTS

The intemperate use of alcohol by the workingman, evenings and nights, imposes a still further economic burden upon the increasing industrialization of Germany, viz., the increase in industrial accidents, which hand in hand with the damage of the life and health of the working man, is constantly becoming a matter of growing importance. As we might conclude without further question from what has gone before, their number stands out most prominently on the work days following Sundays, holidays and particularly pay days.

Here I am in the fortunate position of being able to support my statements with the reliable statistical material of the trade organizations and the national insurance office, which I have included in Table VI with calculations from other sources as far as they extend to accidents occurring on the separate days of the week.

TABLE VI. Accidents Occurring on the Separate Week Days

		Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
1897	Average for the German Empire ¹ ..	17.57	16.71	15.72	15.72	15.14	17.00
1885-1898	North Austrian Building Trades ² ..	18.70	15.60	15.60	16.20	16.60	16.20
1889-1899	Milling, General ³	16.70	15.90	14.90	14.60	15.90	17.30
1889-1893	Land and Forest Cultivation ³	16.80	15.90	16.00	14.70	15.60	15.50
1897	(40 weeks) Ship Building concern, Hamburg ⁴	19.20	16.90	16.30	14.90	15.20	17.50
1898	Lower Alsace—over the weekly averages ⁵	Monday, 14 per cent.		Friday, 10 per cent.			

We see that the frequency of accidents on the average for the empire reaches its highest point on Monday, and steadily declines until Saturday, which is the usual pay day, when it quickly rises almost to the height of Monday. The other computations show also, with few exceptions, that Monday stands at the top of the danger scale with a corresponding increase at the end of the week. In the milling trade union where Monday and Saturday have changed places, pay-day falls usually on Friday. In Lower Alsace where Friday stands next to Monday in number of accidents, there are many trades in which Thursday is pay-day.

¹ Handwörterbuch der Staatswissenschaften.

² Aertzliche Sachverständigen-Zeitung. 1899. Nr. 8. Von den Amerikan. Bauarbeitern berichtet Dr. Golewzewsky sogar 19,9 per cent Unfälle am Montag.

³ Berechnet nach Dr. Flade, Soziale Gesetzgebung und Alkoholfrage. Der Alkoholismus, 1902. S. 386.

⁴ Asmussen.

⁵ Dr. Wolf, Jahresberichte der Gewerbeaufsichtsbeamten, 1898.

These figures do away at once with the supposition that the work in many of the leading kinds of labor is so exhausting that the body does not fully recover during the one free day occurring between two working days and that the fatigue accumulates during the course of the week. If this view were correct, the number of accidents would increase during the week with the increasing fatigue and its accompanying decrease of attention. Since precisely the opposite is the case, there is nothing further to be done but to make the workman's wild running after pleasure responsible for the higher accident rate on Monday and Saturday.

Fatigue As a Factor In Accidents

The questions that now arise, from the standpoint of our inquiry, is not simply a theoretical one. Which factor has the greater influence—excessive fatigue caused by the preceding sleepless night spent in the saloon or the dance hall, or the use of alcohol connected therewith? Further, there is the not less important question whether it is the usually larger but still so-called moderate amount of alcohol consumed, or only the after-effect of drunkenness which increases the frequency of accidents the following workday. Clear information on this point has hitherto been lacking.

From the analysis of the effects of alcohol upon the human body, fortunately obtained through the scientific experiments of recent years, we are able today to defend and prove the statement that both Monday and Saturday are affected, Monday by the "hang-over" from Sunday drinking, and Saturday by the fact that usually the public-house keepers open credit with the workmen the day before pay-day in anticipation of his coming wages.

The Alcohol Factor Not Clearly Shown by Statistics

Those who hold the view that the greater blame should fall not upon alcohol but upon the fatigue caused by the other Sunday pleasures, find their chief support in the statistical evidence of the small influence that drunkenness exerts upon the frequency of accidents in general. The national insurance office which has only recently begun to work up its statistical material on the causes of accidents has published its results of the farmers' and foresters' trades union for the year 1901. Of the 56,936 accidents appearing here, only 94 are traced to drunkenness. Nothing would be more fallacious, however, than to draw from these insignificant figures the conclusion that the use of alcohol has little significance in the frequency of accidents.

In the first place, the national insurance report places no exhaustive material at our disposal, because, as Dr. Flade points out, a special inquiry about intoxication and its after-effects was not provided for in the questionnaire sent to the trade organizations. But aside from this, the statistics are only fragmentary because they include only those unlucky workmen who have shown evident symptoms of drunkenness, while so-called moderate drinking on the previous night is a more important instigating cause of accidents on the following work day because it is so much more widespread. There can be no further doubt today that the precursor of accidents are not only external symptoms of drunkenness such as insufficient attention, diminished clearness of perception, a tendency to inconsiderate and impulsive movements, but also the later stages of a preceding intoxication that no longer shows any external, apparent symptoms, of what indeed in the usual sense was a moderate use of alcohol.

Physiological Effects Explain Occurrence of Accidents.

The physiological experiments referred to earlier in this work show that the faculty of perception suffers after even very small amounts of alcohol, the number of associations, the thoughts, diminish. There is relaxation of a brain function that nature has provided for the better protection of the body, and the feeling of freedom from care which otherwise comes only when no danger is present, gains the upper hand. This feeling of security is therefore only a delusion of the mind, the watchman that normally holds one back from danger. Even Flade holds this position. He says: "It is not the intoxicated man who is a serious burden to the insurance companies. Indeed he now rarely finds permanent employment. But it is the habitual drinker in the labor organizations, men who perhaps are but seldom drunk, but who think they cannot work unless day after day they take a certain quantity of alcohol."

Flade's work published in 1900 showed only the beginning of an awakening to this knowledge among the trade organizations.

The accident insurance regulations of the millers' trades unions state that not only intoxicated men but those in a state of exhilaration through drink are to be kept away from the workshops. They acknowledge that the continued after-effects of habitual intemperance are not infrequently the cause of accidents. "Larger than the number of cases directly attributable to drunkenness," writes the Mecklenburg-Strelitz trades union, "is the number among those injured while under the after-effects of a state of intoxication."

Other trade organizations, according to Flade, have expressed themselves in a similar way. When the wagon-makers' trades unions charged the contractor to employ only sober men as drivers for wagons drawn by horses, we know how little importance to give to the liberality with which the word "sober" is used in Germany. Not a small number of drivers meet with accidents, not because they are exhilarated by drink, but because under the influence of habitual "moderate" use still regarded as sobriety, they fall asleep on the seat and tumble off.

The Hamburg agricultural trade union, on the contrary, "does not take the stand that the moderate daily use of alcohol by healthy men must of necessity bring about the serious consequences described by Flade," and the Rhine-Westfalian trades union for machine building and small industries wrote:

"According to our experience, the supposition that thousands of accidents occur annually as a result of drunkenness does not apply to private industries in which spirit-drinking is forbidden either by the factory rules or the directions for the prevention of accidents."

Because of the incompleteness of the question blank of the national insurance office, it is, of course, impossible to compute the financial extent of the injury which the trades accident insurance societies suffer through the drunkenness or the excitation of the workmen, to say nothing of obtaining even an approximate idea of how far the after-effects of a previous day's immoderate or moderate use are to be held responsible. This way of counteracting the, unfortunately, still widely prevailing opinion is therefore impracticable.

But some other ways are open to us in which we wish to try to bring evidence that puts the increase of accidents at the beginning and end of the week as good as conclusively to the account of alcohol. If we succeed in this, it would at the same time show that the use of alcohol, far short of the bounds of drunk-

eness, or even visible excitation, exerts a strong influence upon the danger of accidents. Because of the high financial importance of this evidence for the trade organizations I will enter more closely into the facts concerning it.

The Seasonal Parallel Between Accidents and Delirium Tremens

I will use first for this purpose a calculation of the distribution of the total accidents of the year 1897 among the separate months, for which we are also indebted to the national insurance office, and place these over against the corresponding distribution of cases of chronic alcoholism and delirium tremens.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Alcohol cases	7.50	7.14	6.96	8.10	8.34	8.09	9.72	8.94	8.56	9.25	8.85	8.55
Accidents	0.92	0.92	0.90	0.90	1.00	1.01	1.10	1.05	1.10	1.09	1.05	0.96

The last table prepared by Dr. Baer ("The Influence of the Time of the Year upon Drunkenness," *Berlin Klinischen Wochenschrift*, 1899) covered all the alcoholic cases, 15,997, admitted to the eight great public hospitals of Berlin in the twenty year period from 1879-1898 inclusive. Both computations show their maximum in July (July to November) and their minimum in March (January to March). Of course it would not do to conclude that the most alcohol is used in the month of July and the least in March. One is only justified in attributing this concurrence of the high points of accidents and of alcoholic disease to the high external temperature as the common predisposing condition, and to alcohol the role of the direct provocation and therefore of responsible factor.

We might explain the great tendency to disease while using the customary amount of alcohol—superficially considered uninjurious—on the one hand by the diminished resistance of the nervous system, to which such high temperature tends, on the other hand by the lowered activity of the brain, the chief mass of the nervous system, upon which falls the task of guarding the whole body from accidents and disease.

The use of what may be considered a very moderate amount of alcohol during the hot months may be assumed to lead to accidents much sooner than it would in winter. Indeed, it would not detract from this conclusion if the absolute amount of alcohol consumed in the hot months should be smaller. The much greater susceptibility of the nervous system causes a more pronounced effect from even smaller quantities, hence an increased number of accidents means that the alcohol consumption in summer is too high in relation to the external temperature.

On the other hand, in harmony with this, the minimum of accidents in the cold months can be explained only by a smaller consumption of alcohol in relation to the prevailing cold—since this favors a speedy oxidation of the alcohol. The minimum falls in the period from January to March, because even though the cold of these months is more severely felt on account of unfavorable housing conditions among large classes of people, the more rapid oxidation of the alcohol reduces proportionally the injury brought about by the increased consumption.

It may be that in March, when the cold abates and the softer air and mild temperature produce agreeable sensations the effects of the alcohol are not craved as before notwithstanding the bad housing conditions, and the consumption, therefore, declines. The perplexing interpretation is that of the contrasting

numbers of April. But the small differences of the two series of figures afford no real basis of comparison on account of the dissimilar conditions of time and place under which they were obtained. In any case, the relation between the number of accidents and the alcohol consumption in the official statistics by months is not to be mistaken, and is such that we should turn away from the wholly untenable opinion that high temperature in itself may be blamed for such an increase in the number of accidents.

The Effect of Alcohol Upon the Spirits Tends to Injuries

We come to a new line of evidence when we direct out attention to the very different behavior of those workmen who are feeling the effects of a free use of alcohol on the previous evening and those who, as they say, have not "slept it off." With the first, there is, besides the general feeling of fatigue, a characteristic coloring of the spirits; a morose manner, great irritability, a tendency to biting speech, quarreling and wrangling and, with fatigue, a constant air of failure which in a small degree may be explained by the feeling of contrast to that of the preceding agreeable narcotic state, but essentially a symptom of the still lingering intoxication.

To this state belongs also the characteristic tendency, originating in the greater ease of muscular movement, to play with one's own strength, to scuffle or fight, a tendency in which lies the danger of bodily injury arising from the diminished sense of responsibility, that is, the lowered functional activity of the brain. If we place side by side the average of accidents occurring on the separate days of the week and the corresponding distribution of convictions for assaults, according to the national statistics for the years 1898-1899, we find again a striking parallel not only in the highest and lowest points, but also in the same descending tendency up to Friday and the same sudden rise on Saturday to a level nearly equal to that of Monday, such as we found inversely in the efficiency of the separate days of the week.

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Accidents	17.57	16.70	15.72	15.72	15.14	17.00	...
Assaults	125.00	69.00	62.00	0.62	3.48	103.00	254

Like effects lead to the supposition of like causes. In assaults the use of alcohol is an undisputed cause of the variations.

If the workman's fatigue and not the effects of alcohol occupied the foreground on Monday, it would be shown in a clearly manifested disinclination for scuffling and scrambling, and assaults on Monday would stand lowest. That the opposite is the case indicates clearly that the fatigue theory under which term I include those opinions which attribute the increase of accidents on Monday chiefly to sleepless nights, long sitting in the public-house, and excessive pursuit of pleasures, are untenable.

If then the use of alcohol and not the fatigue continuing over from Sunday and Sunday night is made to bear the blame for the varying frequency of accidents, the Sundays and holidays on which no less alcohol is drunk must show equally high accident figures. This we cannot prove by the available official statistics on account of the rest from trade work on Sunday. Nevertheless, we may find confirmation in the report of the Voluntary Safety Society

of Munich for the year 1896: 16.09 per cent more accidents occurred on Sunday than on any other day of the week except Monday, which furnished 16.53 per cent.

Arrests for Drunkenness by Days of the Week

Almost exactly the same proportionate numbers for the separate days of the week as for efficiency, assaults and accidents is shown by the authoritative report of the cases of drunkenness. In the city of Hildesheim, which possesses most careful statistics of drunkenness, the cases committed to jail for this cause in the seven years 1896-1902 were distributed over the days of the week as follows:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
224	148	99	86	119	144	183

The high point was reached on Monday. Sunday comes near to it and then follow Tuesday and Saturday. The soberest day is Thursday.

A third piece of evidence is furnished us by the transportation trade union, which, according to the official report for the year 1897, showed the greatest number of accidents of all the trade organizations. Here 68.8 per cent more accidents occurred on Monday morning between 6 and 9 o'clock than in the same time on other days of the week. During the time from 9 to 12 o'clock, Mondays, there were only 63.4 per cent more than the corresponding average for the week, hence no increase (from the earlier morning period) as one would expect if the fatigue from the previous day had had a considerable influence.

The highest figures for the same time are likewise shown by the almost equally endangered members of the brewers' and maltsters' trades union and the stone-cutters' union, which have, respectively, 60 and 50.54 per cent more accidents for these hours on Monday than on the other week days.

It does not follow, of course, that no importance is to be attached to over-fatigue as a cause of accidents; I refer here to the figures of the miners' trade organization and the excessively long hours of railroad and street car men. Such cases may even be increased occasionally in vocational and local limits without making any change in the national average as to the secondary role which fatigue plays to alcohol as a cause of accidents.

The calculations of the National Insurance Association permit us to make still further investigations from the fact that they show the time of day on which accidents occurred. Unfortunately, instead of giving the accidents for the separate hours, they are given by successive three-hour periods. While this limits considerably a critical consideration, and while final conclusions may not be drawn from it, I still believe I need not refrain from making a start in this direction.

The Time of Day When Most Accidents Occur

According to this calculation, the period from 9-12 in the morning shows the greatest frequency of accidents; next is the time from 3 to 6 in the afternoon. According to the fatigue theory, the afternoon hours should show the greatest frequency. The other periods of the day are not comparable with one another because of the difference in the various industries, in the hour of beginning work in the morning between 6 and 9, also the difference in the length

of the noonday intermission between 12 and 3. The greater frequency of accidents in the morning hours from 9 to 12 is open to the explanation that shortly before this time, on an almost empty stomach, some kind of an alcoholic drink is taken and this is accompanied with an impairment of the mental faculties; the smaller number in the afternoon may be explained by the larger midday meal, which helps to lighten the injury from the alcohol, even though it was taken again at noon, and also by the effect of the noon intermission which reduces the fatigue. The alcohol taken again at the vesper pause does not show its injurious effects until shortly before the close of the working day, for we have learned from experimental observation that for about an hour after taking a moderate amount there is a rise in the mental activity and not until then is the injury manifested. The increase in accidents would, therefore, first set in toward the end of the 3 to 6 o'clock period and the number of accidents at this time would not have a chance to rise above that of the forenoon.

The Fatigue Theory Does Not Hold

I am not able to agree with the interpretation which Counsellor Wolff has given to statistics of accidents occurring during the last working hour, collected in Lower Alsace. His opinion is that while alcohol used between meals is partly to blame for the increase of accidents, the chief weight is to be laid upon the increasing fatigue and the digestive process during work. His peak of the accidents falls between 9 and 11 in the forenoon, which is in harmony with the opinion I have previously expressed, that with the usual amounts used the maximum effect occurs the second and third hour after use, which is usually at the 8 o'clock meal hour. Why in his statistics the afternoon shows about 12 per cent more accidents than the forenoon is not explainable without more knowledge of the local conditions. According to the accumulation of evidence showing that fatigue not originating in alcohol is of only insignificant importance in the frequency of accidents, we can only judge that this difference is due to some local factor. We shall not go astray if we consider the national average as furnishing the better evidence, and according to this 43.5 per cent of all accidents occur between 6 and 12 in the forenoon and only 39.12 per cent in the afternoon hours. Hence, although we may not draw hard and fast conclusions from the distribution of accidents over the separate hours of the day, still the greater frequency of accidents in the morning hours, shown by the national average, gives no support to the fatigue theory.

Alcohol and the Public House a Vicious Circle

Apart from the theoretically important decision that the effect of alcohol and not fatigue is the more important cause of the variation in accidents, there is to be emphasized the practical fact that while the use of alcohol is due to the long hours spent in the public house, it also furnishes the indirect cause for being there. For without alcohol, which impairs the judgment in regard to time as well as in other respects, banishes the feeling of fatigue and thereby leads to the expenditure of time and strength, the stay in the public house would come quickly to an end, and give place to a desire for higher pleasures which provide exercise for the mental faculties instead of weakening them.

The mental condition which prepares the way for accidents will be pronounced on the following day in proportion to the amount of alcohol used the

night before, on the one hand, and on the other, the more poorly nourished the body is the smaller its power of resistance. The younger and stronger the body, the more quickly will the Monday night's rest restore it. The varying rate in the decrease of accidents from Monday to Tuesday is influenced partly by natural tendency, partly by the local and occupational customs of the place as to whether Monday is used for rest or for further drinking.

We may say, therefore, in concluding, that although the decrease in the frequency of accidents in the course of Monday morning, like the annual coincidence in the peak of accidents and alcoholic disease and also the weekly coincidence in peaks of accidents and assaults lend a certain support to our proposition that the variations in accident frequency may safely be attributed to the use of alcohol and indeed, not simply to the immoderate use.

If trades unions miscalculate the danger which lies in the conception that the accidents attributed to drunkenness constitute practically the whole of the influence of alcohol as a cause of accidents, the relative insignificance of the figures found by them will certainly lead to an underestimate of alcohol as a cause of accidents and will continue the excessive expenditures of the trade unions concerned.

The Money Side of the Alcohol Burden Upon Industry

The growing burdens placed upon the trade organizations by the use of alcohol are exceedingly important. Computations of the extent of these have naturally included only the accidents which were due to a more or less, but openly evident state of drunkenness. The land and forest trade organizations, for example, had to pay out in pensions for only 13 accidents on account of drunkenness occurring during 1889-1899, the sum of 7,620.39 marks. The wagon trade union had to pay in 1890 to 1899 for 146 accidents on account of drunkenness, of which 52 were fatal, a total of 75,652.84 marks.

Suppose there had been provided for the workmen a higher kind of enjoyment which had led them to devote their spare time, and particularly their Sundays, to true recreation and invigoration, there would have been saved to the trade organization, considering holiday a regular day, at least 7 per cent of all accidents and accident costs for the year 1897, an amount that would have figured up to 4,478,148.34 marks. Apparently the expense is in fact considerably more, because it must be assumed that the number of accidents normally occurring on holidays would be still higher. The increasing expense of such accidents constitutes a price which in itself, entirely aside from life and health, is sufficient to call for energetic action on the part of the employer.

Part III.

THE EFFECT OF ALCOHOL ON HEALTH

The hygienic side of the relation of alcohol to the human organism has been so often and so thoroughly treated from the medical standpoint, that I shall confine myself to the financial point of view. The question of interest to us is, How great are the burdens which grow out of the injury to health from the habitual moderate use of alcohol for the individual business man as well as for the general national work.

It is impossible today to answer this question in detail from the figures at hand. Heretofore, attempts to obtain statistics of this kind have been confined to undoubted and clear cases of acute intoxication and the definite results of habitual immoderate use of alcohol. These figures are not to be overlooked, yet they show only a part of the cost, because they do not include the impairment of the body's resistance to sickness which appears not only in disease entirely due to alcohol, but in other diseases.

Alcoholic Death Rate in Prussia

Dr. Schenk, who has collected records of cases of deaths from alcoholic intoxication, in 1900 gave the annual number in Prussia as 2,000. These were deaths of persons in the prime of life. The suicides due to alcohol he gave as 1,600. Dr. Waldschmidt published in 1899 more exact figures. According to these, there were found in the general hospitals of Prussia 14,386 alcoholic patients; in the insane asylums the same year were 6,975. In 30 per cent (2,092) of the alcoholic patients no other appearance of disease was observable than the pure picture of the craving for alcohol. There were in all 438 cases of drunkenness, 2,098 of chronic drunkenness and 3,978 of delirium tremens. In the same year, 783 persons died of delirium tremens alone.

But these figures give an incomplete account of the annual destructive effects of alcohol upon the health of the people, because they cover only the particularly severe cases, those that needed hospital treatment and only such as were picked up from the poorer classes. They do not include (1) the diseases due to chronic alcohol poisoning which were treated outside of hospitals; (2) the cases not recognized as disease entirely due to alcohol, or in which the causes were purposely hidden; or (3) the alcoholic patients in well-to-do classes who were taken care of at home. Thus the figures of Waldschmidt constitute only a small fraction of the actual annual number of alcohol patients.

Alcohol Weakens Resistance to Disease

On the other hand the following consideration serves as a means of weighing the above figures. In the development of every disease there are two factors to be considered. First, the disease-producing agent (here the use of al-

cohol) in contact with the body, and, second, a susceptible body with insufficient power of resistance. The latter is more or less the condition of workmen who are exposed to injuries connected with their work such as breathing inorganic poisons (lead or arsenic) or germ-laden dust; those who have been injured by machinery, or those who have damaged themselves with poor food, bad housing, or irrational and unhygienic living.

In such workmen serious disease will be produced by an amount of alcohol which would appear moderate and uninjurious in members of society who are well nourished and live rationally. Here the alcoholic disease in many cases is brought about by the fact that an inferior organism puts up an unequal battle. In other words, under more favorable social conditions alcoholic disease in these classes of society would be less frequent.

There are two ways of showing how great an impairment of the power of resistance against disease-producing influences is caused by the effects of alcohol alone, one direct, the other indirect. By the indirect method, one determines the amount of disease in general, and of alcoholic disease in particular, for a given period of time in which men worked and lived under the old unfavorable external conditions, and then obtains the figures for the same period under the best imaginable hygienic conditions. The difference will give the factor—injury from the use of alcohol.

When Abstainers Are Compared With Non-Abstainers

The other simpler and more direct way requires a large group of abstaining workmen (because there is no precise conception of moderation, capable of statistical representation) engaged in the same industry as their non-abstaining associates and living under the same general social conditions. The difference in the sick rates of the two groups indicates very fairly the influence of alcohol as a disease-producing factor.

For the present there is little prospect of being able to do this with German figures because there is lacking the large number of abstaining workmen in any one calling.

To come to a clearer understanding we must turn to a foreign country where the idea of abstinence as a practical course has found a fruitful soil among the people.

According to the figures which were sent to me from England, the abstinence society of Rechabites in the Bradford district had an average sickness duration of seven days, one and one-half hours per member each year of the decade 1892-1901, while, during the same time the sickness duration of the members of the Manchester Unity of Odd Fellows (Bradford district) a society which demanded only moderation of its members, was eleven days, eight and three-quarters hours.

Independent Order of Rechabites, Bradford District (England), 1892-1901

(Abstinence required)	Av. No. Members without Wives and Children.	Av. Duration Sickness.	Av. Assm't. Paym't. per Member.
.....3173		7.1 days	\$2.79

Odd Fellows, Bradford District

(Abstinence not required)	4661	11.4 days	\$3.38
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That is, the resistance of the abstaining Rechabites against disease was about 38 per cent higher than that of the moderate Odd Fellows. There is no reason to doubt that if we had abstinent benefit societies in Germany, a similarly great difference would be shown.

One basis for this statement is found in the records of the treasuries of the local and trade benefit clubs. These show a much higher rate of sickness among the members of the German benefit societies (40.8, 57 per cent, sick members, against 18.08, 25 per cent, than in the English societies) and the duration of sickness is much longer (17-28 days against 7-12 days). But aside from this, what is of special and striking interest to us here, is the higher rate of sickness, compared with the general class among the trades that are known to consume large amounts of alcohol, such as masons, carpenters and brewers. Moreover, these classes are compared with others in which the use of alcohol is by no means always within the bounds of moderation, yet the difference in the sick rate among workmen in the same locality, amounts to from 9.1 to 21.3 per cent.

Of course, the use of alcohol is not the only factor which causes the greater frequency of sickness among the harder drinkers. With the masons, for example, unfavorable working conditions alone would increase the amount of sickness in some degree. But this factor does not enter into the case of the brewers, who work under relatively favorable conditions and yet show a considerably higher rate of sickness.

The great role which alcohol plays with us in Germany in the frequency of sickness can only be exactly measured, as already stated, when the abstaining members of the different classes of occupation are accounted for separately. The difference in frequency would, to all appearances, be considerably more than is shown in the figures of the last table.

Attempts to determine the drain which the use of alcohol by the members lays upon the treasury of sick benefit societies, as already stated, can be shown only in part and in this lies the danger of under-estimating the extent of the burden.

I refer only to the relation between the other great public disease, tuberculosis, and the use of alcohol.* If, for example, the local sick benefit club of Leipsic paid out for 54 drunkards in the years 1887 to 1902, 10,176.75 marks in sick relief, a sum which, moreover, does not represent the full drain upon the treasury, since the relief money amounted to only 39.07 per cent of the sum expended, we must guard ourselves from looking upon this, in and of itself by no means negligible sum, as the extent to which this expenditure has grown in recent times, to say nothing of the alcohol consumption of its members in general.

I would not favor an attempt to reckon the enormous saving for the German insurance funds on the basis of the English tables without further question as to their applicability to our conditions, although they might approach quite near.

* On this point Dr. Baer stated at the Tuberculosis Congress in Berlin (May, 1899): "The combat against tuberculosis as a public disease demands on preventive grounds, besides the provisions for hygienic living among larger numbers of the people, the diminution also of intemperance, because no evil of the body public is so serious and so injurious as this." And Dr. Bonne says (Flade): "There is a fearfully vicious circle between tuberculosis and both chronic and acute alcohol poisoning of the people in that through the use of alcohol the body is made more susceptible to the tuberculosis germ and through the expenditures for alcohol the families of the less well-to-do classes are still more limited in food and housing and the women and children are more easily attacked by tuberculosis."

How small the resistance of the body is to the regular use of alcohol, even though in amounts which are yet today regarded as uninjurious, is shown not only by the tendency to more frequent and longer-lasting illness, but also in the tendency to earlier death, thus prematurely ending the working period of a life. A number of private insurance companies have made use of this fact and allowed their abstaining members from 4 to 15 per cent rebate upon the amount of their premiums. Since resistance to death is essentially the same as resistance to sickness, the insurance mathematician of the sick benefit societies can come to no different result from that of the actuary of a private life insurance company.

It is perfectly reasonable, therefore, to make the following demand of the sickness insurance societies:

Let separate accounts be kept of the abstinent members wherever there are enough to permit of computing for them separate rates. (In Hamburg and Schleswig-Holstein there would probably be enough.) This would put the heavier burden upon the shoulders of those who are responsible for it.

If this requirement could be carried out, it would certainly prove a powerful lever for promoting among such workmen a movement for higher and better pleasures.

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