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Rules of the Power Plant

If you are under medical care, pay no attention to any of these rules. Wait until well!

If you are very young or very old—let's say under fifteen or over sixty-five—do not expect to gain much from these recommendations.

If you are decidedly neurotic, lay the book aside, for it will not help you but may even upset you.

If you are sincerely averse to improving your lot by hard discipline; if you prefer to live along easily, taking things as they come, and being content with small comforts, give this book away to some ambitious youth. It is not for you.

HUMAN ENGINEERING

Each human being is born with a certain amount of available energy and with a certain tendency to burn it up at a fixed rate. How then can we offer him advice about its use? Is this not like trying to tell him how, by taking thought, to add a cubit to his stature? We cannot put into his body more energy than

he generates by nature, can we? And we cannot do much to regulate his rate of burning, or his basal metabolism. Isn't it rather silly, then, to draw up a lot of rules about energy?

Not at all! For there is something to be done with one's energies, regardless of the amount and the way they burn up. How much is to be spent on a particular task? Suppose you must carry a heavy valise upstairs. You may do so in many ways. You may shove it along on the floor to the first step, then put your shoulder under it and heave it up a foot; and so on, in your best clowning fashion. Or you may lug it in your arms as if it were an infant; or pick it up with your right hand, or with your left hand, or with both hands. Now each method uses a different amount of energy. So you have a free choice which makes considerable difference to your career, though you may not realize it at the moment.

Thus with almost every act. There is some one way of spending the least energy, and a million ways of spending more than needed. It does not depend upon how much energy has been bred into your system nor upon the speed at which you burn up. A hundred men of various physiques and metabolic rates may all adopt essentially the same method of performing a task. If the method happens to be wasteful, the strongest man will suffer least in the long run, while the frailest will suffer most. For the

strong is not drained by little losses nearly so much as is the frail, who must conserve every ounce of strength in order to get through life most successfully.

So this book discusses the techniques of efficiency much more than the creation of new energies. Efficiency is the relation between energy spent and results gained. To attain high efficiency, you study all the effects of each act; you notice the points and moments at which the same good result can be gained simply by cutting out lost motions, or by moving a trifle faster or perhaps more slowly, or by pausing to rest at fixed intervals, or by changing your method of holding tools, or by saying certain things to people under you.

All this is engineering, nothing less. It calls for complete objectivity, freedom from emotion and sentiment, and a willingness to compute to the finest shade and measure. Throughout our discussion, you must regard your body as a super-automobile which can be made to function properly only when hundreds of very precise adjustments have been made.

Bear in mind that each rule must be applied in some minor variation to your own case, according to your age, sex, kind of training, general health, aptitudes, and ambitions. Usually common sense will guide you in fitting a rule to your own personality.

PLAN! PLAN! AND THEN PLAN!

To tap your energies most effectively, you must first learn what you want to get out of life. You can learn this only through long and careful study of things and people, including yourself. Do not expect to reach clear conclusions early in life; for you are changing in mind and body throughout the first third of your years, and each change shifts the scene and your own perspectives. Rare the man who finds himself without going through a long period of hard, clear thinking about his interests and his opportunities.

Eighty out of every hundred men of high achievement as listed in "Who's Who" began planning their careers early in life, usually during their 'teens. (Burnham's careful interview with 1,000 such first established this fact, which has later been corroborated by various investigators.) Many of these distinguished men testify to having written out elaborate studies of their own interests, wishes and abilities during high school and college years. Others made surveys of opportunities as best they could. Others called on prominent men in fields that appealed to them and gathered information and advice. Can anybody doubt that this methodical foresight had much to do with later success?

But many equally ambitious people have failed largely because they did not make a sim-

ilar analysis of their own energies and did not set out to train themselves as machines. Merely finding the right career is no guarantee of victory. Having found it, one must discover early just what powers and sensitivities it requires; and just how one may develop such.

Do not be in the slightest degree disheartened if, up to your thirtieth year, you cannot make up your mind exactly as to what you most keenly desire. Test and try many attractive projects, as long as you remain uncertain. Out of such experimenting wisdom will come—if ever.

While waiting for your larger career to assume clear form, apply our rules to local and partial aims. For instance, if you are in college, apply the rules to your task of studying. If you go in for college athletics, apply the rules to the energies you consume in such contests.

Skill in using energy in such special forms is not transferable to other enterprises, except in so far as the latter resemble the tasks in which you have formed good work habits. A man may become absolute master of his energies in the mile run or in Latin prose, and yet bungle and waste his powers in trying to run a meat market or a farm.

STORING UP ENERGY

Food and Drink

Provided you are not excessively stout, maintain substantially the same weight from

month to month, have adequate energy for your work and no serious digestive upsets, be guided by your appetite in the *quantity* of food you require, but not the *quality*.

To insure proper quality, let your diet be varied, and include liberal quantities of fresh fruit, vegetables, and milk if the latter agrees with you.

Pay little attention to the many tables of normal weight which various authorities issue from time to time. Individual differences loom large here. In my opinion, people may be in the pink of condition and still vary from seven to eight per cent from the weights given in such tables.

Prefer natural to prepared foods.

If you work hard with your muscles or exercise much in the open air, you require more food than if you spend most of your time sitting down.

A diet for sedentary or intellectual work should include 30 calories of food per kilogram of body weight every twenty-four hours. Eat protein and starch in moderation.

If you work moderately hard with your muscles, allow 36 calories per kilogram of body weight every twenty-four hours. Eat around two and a half ounces of meat daily, and a moderate amount of starch and sugar.

A diet for hard physical work should include foods high in carbohydrates, and a total of between 50 and 70 calories per kilogram of

body weight per twenty-four hours. Eat any form of wheat, sugar, most cereals, beans, rice, hominy, prunes, raisins, dates, bread, and potatoes, and not more than seven ounces of meat daily. Beware of cornmeal, which, though high in carbohydrate, is low in its availability.

If you normally eat little protein and do little heavy labor, you are in poor condition for a sudden overload. If you must work hard, increase your protein diet on the two or three days immediately before the exertion starts.

Especially after thirty-five, eat less meat, fish and eggs, and more fruits and vegetables, particularly those high in vitamin content.

Try eating malt sugar just before doing hard work requiring strength and speed. Do the same with phosphate. This we discussed on pages 66 and 67.

Experiment with tea and coffee. They may or may not agree with you. Your "instincts" here will probably guide you reliably.

If you must do hard physical work in warm air, try adding a little salt to your drinking water. Miners did this and became exhausted less quickly when drinking water with as little as a fifth of one per cent of common salt. Probably the salt thus taken serves to supplant some of that lost in perspiration.

Unless you take liquids in other forms, drink at least six glasses of water daily.

To work efficiently, refrain from all al-

cohol. But if you have difficulty in relaxing after hard mental work, try brisk exercise. If that fails to let you down, try drinking beer or ale in moderation.

Eat in a quiet place whenever possible. Noise reduces the stomach secretions and thus slows down digestion. The least harmful sounds are those of conversation. A shrieking radio or similar atrocity cuts the flow of saliva to one-half of normal. The sooner you digest your meal, the sooner you are fit to work at top efficiency.

Eat slowly, of course. But don't be afraid to gulp your food, if you must hurry; for gulping is much less harmful than physicians used to believe.

If you must eat in a din, drink coffee and eat sugar in any form you prefer, be it an extra spoonful in your coffee or a helping of candy after your meal. These foods speed up digestion and offset the bad effects of noise to a considerable degree.

If you are healthy, eat when hungry. Cultivate the "nibbling habit." Many recent experiments indicate that digestion and working efficiency are greatly improved by five or six meals a day rather than the standard three, provided you do not increase the total quantity or change the quality required for good health.

Dieticians sometimes advise you to eat less food in summer than in winter. Beware of

following this rule blindly. Many people get their only chance of heavy physical exercise in the summertime. They work in offices all winter, and get little opportunity for even moderate exercise. Therefore they probably will want to eat more in summer than in winter. Regulate the amount of food you eat chiefly by the amount of energy you burn up.

Avoid hearty meals just before heavy work, when fatigued, or when doing hard mental work. When greatly fatigued, don't eat until after you have rested.

If you are highly strung, light weight, or under-nourished, don't go many hours without food. Between meals eat a little, or else drink something nourishing, like milk, buttermilk, or chocolate malted milk.

If moderately weary toward the end of a day, try eating sugar in some form.

Never eat while angry or frightened. If possible, wait a full hour after your rage or fear has passed. Why? Because your adrenal glands pour something into your blood that draws the blood away from your entire digestive tract.

Never take a bath until at least two hours after eating.

Find your own best behavior after meals. What happens if you lie down? Many people are knocked silly if they do this. Their stomachs slow down, and food lingers there much too long. What happens if you exercise vigorously?

Probably this upsets digestion still worse, though some workers seem able to go straight back to heavy labor soon after a square meal.

Most people are probably helped by very gentle exercise after eating. This stimulates the digestive processes favorably, as a rule. The stomach empties fastest then. Standing up is probably better than lying down, except for certain nervous and aged types of people; for the basal metabolism is higher then.

Suggestions about Exercise

Be in fresh air as much as possible. If you normally get little recreative exercise, walk to and from your work and appointments.

Work and play at high speed if you are young and healthy. Pull in a little during your thirties, and still more after forty.

When young, avoid committing slow suicide by rowing in college crews and playing on college football teams. These games kill. Listen to the warning of Dr. Bolivar J. Lloyd, of the United States Public Health Service:

“Too many older men who were football players in their youth are succumbing to heart disease as a direct result of having overtaxed themselves on the playing field. Football as it is played today is not worth the price in human life.”

Strenuous rowing has much the same effect on the heart.

When past forty, give up tennis. Play

golf moderately, if at all. If this seems to fatigue you unduly, give it up at once. The older you are, the more slowly you tend to recover from exertion or shock.

Exercise in cold but not too cold air in the nude helps to harden the skin and aid digestion.

Air, Heat and Light

Live as much as possible in rooms thoroughly cross-ventilated. Otherwise, get fresh air by opening windows at top and bottom. In winter, use an inexpensive ventilator available at any good hardware store, to deflect cold air upward and prevent drafts.

Get into the direct sunlight often, except on very hot days. Thus you increase your resistance to disease and infection. Never remain in the sun long enough to burn seriously or blister. Nude sun bathing is healthful. But begin easy. Expose yourself only five minutes on the first day; then increase the exposure by five minutes each successive day up to an hour or so. Thus you progressively bronze the skin, but do not burn.

Use ultra-violet- and infra-red-ray lamps only under the direction of a physician. No lamp is an adequate substitute for sun rays.

Keep the temperature of your living rooms and offices around 64° F. with a humidity of about 45%. Never allow the latter to drop below 30% or to rise above 60%. Hot, dry air

hastens the evaporation of skin moisture and often increases susceptibility to colds. In winter, put small basins of warm water at the base of registers and radiators if the air is even moderately dry.

Mental work can be done with reasonable efficiency in stagnant air at about 85° F. It is best done by most people in fresh air at 60° F. If the air is humid, don't exercise much when doing mental work.

Physical work, on the other hand, is best done when the temperature is 68° F., the air 50% humid, with about 45 cubic feet of fresh air a minute around your body. This optimum varies slightly for factory workers, who seem to work with greatest comfort in a temperature of 70° F. with the air 40% humid. At 80° F. and 20% humidity, or at 90° F. and 25% humidity, they work without discomfort. You must never do physical work at 90° F. with humidity at 65% or above; and do as little as possible when the humidity is only 50%.

If you must move to another town, choose one in a similar or warmer climate, not a colder one. Otherwise you will probably adapt yourself with difficulty to the climate, and be markedly hampered for some time, if not permanently.

A Few Rules of Hygiene

Wear comfortable clothing. It should never be tight. The normal foot is broader at

the toes than at the heel. Buy shoes accordingly, unless you are a slave to fashion. The toe of the shoe should allow your toes to move around comfortably, and the heel and toe should conform to a straight line drawn from the inner extremity of each. Never buy pointed shoes, and avoid high heels.

Sit and stand in a comfortable posture. The old rule of head up, chest out, chin and stomach in, if followed slavishly, burns up more energy than positions that leave you more at ease. Keep the muscles of your abdomen firm and taut. Follow this rule both in standing and sitting. The ordinary chair tends to make this difficult. If so, insert a small pillow. When working at your desk or table, keep close to the desk, sitting well back in the chair. Lean over from the hips, not the waist. Never bend the head from the neck at a sharp angle when reading and studying. You strain muscles unnecessarily, and tax the eyes severely.

Avoid harmful dusts. These include flour and starch dust, which may explode, and dusts like those from sand and alkali, wood, bran, coal, clay, minerals and stone, which are harmful to the respiratory system. The dust from ordinary soil is usually harmless.

Keep clean, of course. Probably a clean skin gives off body heat more efficiently than a dirty one. And heat thus dissipated eases the load on the kidneys at least measurably.

Beware of too many cold baths. How

many is too many? You must answer that for yourself. Much depends upon your age and the sort of work you are doing. A man engaged in heavy labor warms up, perspires, becomes unclean, and perhaps has difficulty in cooling off. He deserves a shower as cold as he likes; for it speeds up his return to normal balance. Whatever heat he wastes thereby earns a high dividend in various ways. On the other hand, people in arm chair pursuits often stand under a chill spray on arising, in order to start circulation. While this practice is harmless for many, it is a danger to others; and, if not a danger, then at least a waste of human energy.

Taking as par 100, the healthy city dweller has a hæmoglobin count of about 90. Any drop below this is likely to reveal itself in some disturbance of energy. Have your doctor check up on you here from time to time.

Check up on your heart occasionally. It beats ordinarily at a rate of 65 to 75 times a minute. In a man who keeps himself in tip-top condition, it pumps more slowly when the body is at rest. The heart of an athlete in the pink of condition may run as slowly as 45 beats a minute. The heart of a man who works at fairly heavy tasks outdoors and takes decent care of himself often runs at 55 beats a minute.

Beware of tackling any sudden heavy task if your heart, while you are resting, beats faster than 90 times a minute. This means that it cannot carry the tremendous overload de-

manded by severe exertion. It lacks the necessary margin of pick-up.

If, for long periods, you notice a tendency toward mental confusion, ask a doctor to check up on your blood pressure, which may be too low.

Don't dose and dope. Don't buy *any* patent medicines except under the advice of a physician. Keep away from all purgatives and laxatives as much as possible.

Give up completely if you are normally healthy and taken ill. Don't attempt to "carry on." Giving in at first saves you a month of trouble.

ORGANIZING THE POWER PLANT

Develop the habit of entering a work schedule on your calendar. Make a note of the times when you are likely to be subjected to unusual energy demands for some hard work. Regulate your activities to pile up your energy just before these days or hours of extra effort. This is what any good engineer in charge of a power plant does. He organizes his staff, his equipment, and his full supplies for peak loads. So must every human being who wants to make the most of his energies.

Work Cycles

Never expect even performance in any work or play. Unless you are a freak, you have

your ups and downs. When up, your mind is keen and fast, your muscles nimble and slow to weary, and your interest in things vivid. When down, you are either sluggish or restless; you dislike having to think hard, you bungle simple tasks, and you may show bad temper.

Begin early to keep a record of your ups and downs. It will almost surely turn out that these show a fairly uniform swing. Five, six, or seven weeks most commonly elapse between two ups or two downs. As soon as you have found when you are up, arrange your work, if possible, so that you perform your most important and difficult tasks when at your best; and conversely, when you know that you will soon be down, undertake nothing of consequence then.

Are you ready to go as soon as you arise in the morning? Then, if you are compelled to perform several kinds of work in the course of a day and are at all likely to be fatigued by them, arrange them in the following order:

1. Start the day with the job demanding the greatest *speed* and the highest *dexterity*, particularly of the eye, ear, and small muscles, such as those of the fingers;
2. Proceed next to the task calling for less speed but equal dexterity;
3. Next tackle the job that requires more brute strength than either speed or dexterity;
4. Take up last of all whatever duty

exacts of you the least speed, the lowest order of dexterity, and the lightest physical exertion.

But what if you are the sort of person who wakes up slowly, remains dull and sluggish for some time after breakfast, and picks up to peak performance late in the morning? Then reverse the order of these four rules. Furthermore, reorganize your day if you are this sort of person and most of your important work must be done in the morning.

A nation-wide investigation indicates, in fact, that most work falls in morning hours. Business organizations, such as the General Electric Company, the People's Gas Light & Coke Company, James McCreery & Company, and many others reported that most of their important work is done in the morning. Leading universities and grade schools report that seventy per cent of all important classes are held in the morning. And the Ladies' Home Journal, Woman's Home Companion, Pictorial Review and other women's magazines found, after reports from 25,000 homes, that likewise most of the average woman's work must be done before noon.

The constitutionally sluggish morning worker, then, should arrange his day as follows:

1. Find the minimum number of hours required for completely restful sleeping;
2. Find the average number of hours required for pick-up in the morning;
3. Advance the hours of sleep so as to

bring the first working hour of the morning into the first hour of complete pick-up.

For example, here is a person who takes three hours after arising to hit his pace and finds that he cannot shorten this by any known trick. He holds a job which begins at nine o'clock in the morning. He finds by experiment that his minimum period of completely restful sleep is $7\frac{1}{2}$ hours. Getting from his house to his office consumes half an hour. So he should be asleep at ten o'clock. If he finds that it ordinarily takes 15 minutes for him to go to sleep, he is in bed at quarter of ten and wakes up at five-thirty. This allows time to dress and three full hours to get going at full speed by nine o'clock.

If you are prone to easy anger, make it a fast rule to have on hand several hard jobs on which you may vent your excess of energy in a rage. I have watched people knock out, double, treble, and even quadruple their ordinary amount of work while furious over some petty annoyance. Most of us find it easy to transfer our emotions to irrelevant outlets. Therefore we ought, as wise engineers, to see to it that the outlets chosen serve some use.

In general, emotional excitement interferes with peak performance. Allow time to get over it before you expect your best results. When in a low emotional state, however, you may work more efficiently simply because irrelevant distractions fail to stimulate you. Therefore do not quit working and sit around dole-

fully when you are depressed. On the contrary, work all the harder.

In handling people on a job, never waste your energies by getting mad at them nor by angering them. The human energy used up in the United States in the form of hot emotions which have interfered with efficiency is probably more than enough to manage the entire country, its business and its technologies.

Discharge, as quickly as possible, a worker who habitually shows anger, either toward you or toward anybody else with whom he must work. He is merely so much sand in the gears of your machinery. When you drop him, do not argue with him. But after he has left, it may be a kindness to tip him off about the price he paid for his wasteful temper.

In "warming up," use any harmless accelerator such as tea or coffee. Experiment with the conditions described on pages 61-63.

Also try systematically to warm up by going through the motions of the work to be done, just as football players do before the game opens. If there is nothing else to be done, go through all the motions of arranging your desk and your work place, your tools, your machines, or whatever else you must soon be using.

When taking up a task that is mainly a series of acts all of which you have previously learned well, you ought to strike your pace in a few seconds or minutes. Warming up here is a negligible prelude. But it becomes longer and

more serious as the task grows complex; and it is most important of all in tackling work much of which is strange. In this last instance, warming up cannot be sharply separated from learning the new elements.

A rough-and-ready rule of self-study runs thus: if you spend five, ten, or fifteen minutes in apparent warming up on a job easily performed and thoroughly mastered, the chances are that you have some inner resistance to doing the work quite apart from the warming up mechanism. On the other hand, never expect good results early in any work full of unfamiliar details. Be prepared to spend much time in trying and testing, in making false starts and beginning all over again. If, for example, you are suddenly called upon to write an editorial for your local newspaper, an assignment strange to you in spite of the fact that you may be an authority on the subject of the editorial, you will do well if you spend five times as many minutes over it as a professional writer would; and it will not be at all unusual if you sketch eight or ten introductory paragraphs and throw all away as wrong.

Once you have warmed up to a task, keep moving. Work steadily at your natural pace. Never waste your energy in spurts.

Analyze each job from two points of view: the volume of work, and your natural speed of accomplishment. Adjust the former to the latter.

Never undertake more than you can achieve with comparative ease in a given time.

Some people burn up their energies at a rate nearly 80% faster than some others. Plainly such fast-burning people are best fitted for types of work and play that would never suit slow burners. Where do you happen to fall in this cycle?

RULES FOR PEOPLE OF LOW ENERGY

Don't live in an environment where you must use up your physical energies in running, standing, walking, and similar activities. Especially avoid living in a big city, if possible.

Refrain from emotional excitement of any kind.

Don't attempt to spread your activities widely. Learn to do a few things well and to follow a few interests (preferably mental) thoroughly.

Deal with people as little as possible. Especially avoid the labor of influencing people. Keep away from salesmanship, personnel management, and other fields of work where personal contact and influence is vital.

Do as little physical work as possible. And what you must do be sure to do in the easiest possible tempo. For example, walk upstairs at the rate of one step a second, at the fastest. Time yourself. If this gets you out of breath, slow down.

Always cut corners. Never rise in a train or street car until the car has come to a full stop; nothing is gained by standing up earlier.

Let the other fellow push the revolving door. You slip in behind him and get the benefit of his exertion.

Beware of working in dust or in noise.

Study your own peculiar limitations of energy minutely. Arrange all your exertions in the light of these.

THE ART OF SAVING ENERGY AFTER FORTY

Never open third-class mail. This saves several hundred calories a year.

Always dodge the rush hour, if possible.

Always dodge bargain sales, if possible.

Never look backward except for *information*. Waste no time over memories.

Create a Buffer State between yourself and the Public, to take up all the needless shocks, encounters, high pressure sales talk, and so on. Hire a well-trained secretary. Or an office boy. Or lock yourself in!

Spend a few minutes every day scheming short cuts in your own work.

In answering letters, follow Irving Fisher's technique. (See page 290.)

Never pick up things an able-bodied woman has dropped.

Never give your seat to an able-bodied woman.

Rest whenever you feel like it. Pay no attention to etiquette here.

In all jobs, you do the headwork, and make younger people do the footwork and the tongue work.

Enjoy every least success. Analyze your failures, but never mourn over them. Grieving is pure waste of energy. So is repentance. Never frivol away your powers in remorse.

Wear loose clothes.

Always relax when you sit down.

Read no trashy books and magazines except by way of filling in time you can put to no better use.

Find a few people whose conversation pleases you. Cultivate them like rare flowers.

Always cut corners.