SUMMER SCHOOL

FOR

Physical Training

UNDER THE AUSPICES OF THE

NORTH-AMERICAN GYMNASTIC UNION

AT THE

NORMAL SCHOOL OF GYMNASTICS

MILWAUKEE, WISCONSIN.

A SIX WEEKS COURSE, FROM JUNE 29th TO AUGUST 8th, 1896,

FOR

Public School Teachers and Teachers of Gymnastics.

THIS IS THE ONLY SUMMER SCHOOL IN THE WEST FOR SUCH TRAINING, AND THE ONLY SCHOOL IN THE COUNTRY THAT EXPOUNDS THEORY, METHOD AND SYSTEM OF GERMAN PHYSICAL TRAINING...
OBJECT OF THE SCHOOL.

THE object of this Summer School is to offer to Teachers and Students an opportunity to study German Gymnastics.

The German System of Gymnastics is being used in the Public Schools of numerous cities and towns in almost every State in the Union. In some of the larger cities competent teachers and supervisors are employed, but in far the greater number of schools the instruction of gymnastics is based on text-books in the hands of the regular teachers. These have little or no supervision on the part of the Superintendent of Schools. To say the least, it is very difficult for an inexperienced teacher to correctly interpret the text of a book on gymnastics. The chief aim of this school will therefore, to aid those who are teaching, or who intend to teach in public and private schools, that they may become more skillful in teaching gymnastics and thereby direct the physical welfare of their pupils with greater intelligence than before.

All our foremost educators are giving Physical Training more attention than formerly, and as the interest in this essential branch of education increases, the time will not be far distant when all the progressive States will follow Ohio and make Gymnastics compulsory in all public schools. Now is the time for progressive teachers to prepare themselves for this change and to become familiar with a system of gymnastics that has been taught in the schools of our Union for more than fifty years.

The North American Gymnastic Union guarantees thorough instruction in every department and will give certificates to those who take the entire regular course. The possessor of a certificate will have a fair knowledge of elementary gymnastics, and will be reasonably competent to teach in public and private schools.

The exercises will be conducted at the Union's Normal School, No. 558 to 568 Broadway, Milwaukee, Wis., under the direction of Mr. Geo. Wittich, Supervisor of Physical Training in the St. Louis, Mo., Public Schools.

The Executive Board of the North American Gymnastic Union,

ST. LOUIS, MO.
A. REGULAR COURSE.

Scholars intending to take a certificate must take the full regular course. This consists of all the lectures and the practice of School Gymnastics; i.e., Tactics, Free Exercises, Exercises with Apparatus, Exercises on Apparatus, Field Sports and Games.

The Regular Course begins Monday, June 29th.

B. SPECIAL COURSE.

A Special course will be offered in connection with the regular course. The special course is arranged for those who want to study only some special branches of gymnastics. This course will consist of:

- **Fencing.** (With Foil for Women and Foil and Sword for Men.)
- **Wrestling.** (Catch-as-Catch-Can style.)
- **Boxing.** (Students must furnish their own gloves.)
- **Swimming.** (Students must furnish their own suits and towels.)

The special branches will be taught at such times that scholars of the regular class can also enter the special class. Scholars may take only one branch of the special course if they so desire.

The special course begins Monday, July 6th.

The Gymnastics Suits will consist, for Women, of Blouse and Divided Skirts, preferably blue; for Men, of Flannel Shirt and Pantaloons, preferably gray, and Gymnastic Slippers.

The general arrangement of time is as follows:

- Swimming, 6:30 to 7:30. Gymnastics, 10:00 to 12.
- Fencing, 3:00 to 4:00. Lectures, 8:30 to 10:00.
- Gymnastics, 2:00 to 3:00. Boxing and Wrestling, 4:00 to 5:30.

The weather permitting, the Saturday afternoons will be devoted to outings, open air excursions, during which out-door games and sports will be practiced.

Rooms and lodging can be had in the neighborhood of the Gymnasium at $5.00 per week and upwards.

TUITION FEES.

For the full Regular Course, $25.00. For the full Special Course, the four branches, $30.00. For the separate branches, Fencing, $15.00; Wrestling, $10.00; Boxing, $10.00; Swimming, $10.00.

Scholars of the regular class can take Fencing without additional cost. By paying an additional $5.00 (30.00 in all), they have the privilege of entering any or all other special branches.

N. B.—Former Scholars who have taken the regular course can enter any class this year for half price.

All Fees are payable in advance to the Secretary, Wm. A. Stecher, 3d and Chestnut Sts., St. Louis, Mo. Write to him for application blanks and all general information. For information pertaining to the regular gymnasium work write to the Director, George Wittich, 10th and Carrol Sts., St. Louis, Mo.
SYNOPSIS OF LECTURES AND PRACTICAL WORK.

GYMNASTICS.
By George Wittich.

TACTICS.—
Movements of the individual.
Movements of the rank.
Movements of the body of ranks.
Plain and fancy marches.
March and song roundel (Reigen.)

FREE GYMNASICS.—
Arm, Head, Trunk and Leg Movements.
Combinations of the above.
Modes of execution.
Free Gymnastics with marching and step exercises.
Fancy steps.
Exercises with musical accompaniment.

EXERCISES WITH APPARATUS.—Light Gymnastics.
Short Wands.
Long Wands.
Dumb-bells.
Clubs.
Rings.

EXERCISES UPON APPARATUS.—Heavy Gymnastics.
Horizontal, Slanting and Vertical Ladders.
Balance Boards.
Climbing Poles and Ropes.
Storming Board.
Flying Rings.
Round Swing (Giant Stride).
See Saw (Balance Swing).
Horizontal Bar.
Parallel Bars.
Horse.
Buck.

FIELD SPORTS.—
Running.
Jumping.
Throwing.

GAMES.—
A selection suitable for the School-room, the Gymnasium and the Playground.

DICTATIONS.—
Showing how to grade work for children and adults.

ANATOMY AND PHYSIOLOGY.
By Emil Dapprich.


ORTHOPEDICS, MECHANICAL THERAPEUTICS, MASSAGE, ANTHROPOMETRY.
By Dr. Franz Pfister.

DIAGNOSIS AND CLASSIFICATION OF DEFORMITIES. Treatment: (a) Palliative; (b) Operative; (c) Mechanical.

MECHANICAL THERAPEUTICS.—Theory and Practice. Indications. (a) Medical Gymnastics. (b) Massage.


SYSTEMS, METHODS, APPLIED PHYSIOLOGY, HYGIENE.
By Dr. Carl Zapp.

SYSTEMS.—
The German system.
The Swedish system.
Other systems.
Comparison of the different systems.

METHODS.—
Comparison of the methods of Jahn, Spiess, Jaeger and the present methods.
Combination of Exercises.
PRACTICAL SWEDISH WORK, PRACTICAL EMMERSON AND DELSARTE WORK, PULLEY WEIGHTS.

APPLIED PHYSIOLOGY.—
Effects of exercises on the muscular system, circulation, respiration, etc., the function of the different organs.
Effects on the nervous system and the mind.
Comparative value of different kinds of exercises: Free gymnastics, tactics, marching, roundel (Reigen), apparatus work, field sports, games, etc.
Principles governing the selection of exercises for a lesson for adults, boys and girls.
Effects of certain exercises and apparatus.
Special exercises for the back, chest, abdomen, etc.

HISTORY OF GYMNASTICS.

BY HANS BALLIN.

I. PHYSICAL EXERCISES OF THE NATIONS OF THE ORIENT.
II. THE GREEKS.
(a) Lycurgus and Sparta (Doric States).
(b) Solon and Athens (Ionic States).
(c) Greek Education.
(d) The Plans of Exercise.
(e) The Exercises.
Running, Jumping, Wrestling, Discuss Throwing, Spear Throwing, Pentathlon, Bathing and Swimming, Archery, Ball Playing, Dancing. Influence of gymnastic upon Sculpture.
(f) Athletics
Fist Fight, Pancratium.
(g) Races.
(h) National Games.
Olympian, Pythian, Isthmian, Nemean.

III. THE ROMANS.

IV. THE ANCIENT TEUTONS.

V. MIDDLE AGES.
Chivalric Education. Tournaments.

VI. HUMANISM AND REFORMATION.
Constantinople (1453). Gutenberg, Discoveries. French, English and Italian Humanists, German Humanists and Reformers.

VII. PHYSICAL EXERCISES.
In Academies and Universities.

VIII. NATURALISTS.
Montaigne, Locke, Rousseau, Tissot.

IX. PHILANTHROPISTS.

X. PESTALOZZI, JAHN.
Jean Paul, Plamann, Napoleonic Wars, Fichte, Schenckendorf, Arndt, Kœrner, Ruckert, Friesen, Follen, Duerre, Kotzebue.

XI. EISELEN, Luebeck, Ballot, Böttcher, Harnisch, Massmann, Kloss, Klumpp, Werner.

XII. CLIAS, AMOROS, NACHTEGALL, OBERMANN.

XIII. BRESLAU DISPUTE.
Passow, Raumer, Harnisch, Steffens, Menzel, Lorinser, Koch.

XIV. SPIESS AND LANG.
Wassmannendorf. 1842. Separation of School and Society Gymnastics, Rothstein.

XV. NORTH AMERICAN GYMNASTIC UNION.
Colleges, Universities, Public Schools, Systems.

XVI. PHYSICAL TRAINING AT PRESENT.
Society, Schools, Gymnastic Associations, Sports, and Athletics. Gymnastic Conventions and Tournament, Training of Teachers.

INFORMAL TALKS.

BY CARL KROCH.

Mr. Kroh will deliver a few informal talks in the gymnasium on interesting subjects pertaining to gymnastics.

PSYCHOLOGY.

BY DR. WM. O. KROHN.

Dr. Krohn will deliver a series of ten or twelve lectures along the lines of experimental psychology.

FENCING, WRESTLING, BOXING.

BY FERD. FROELICH.

WRESTLING—The "Catch-as-Catch-Can" system. The different attacks and parries. Practical work on the mat.
BOXING—Positions—Thrusts—Parries—Returns. Practical work.
SWIMMING—By Julius W. Rohn. Practical work at the swimming school situated on the Milwaukee river.
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NAMES OF SCHOLARS OF LAST YEAR'S CLASS.

Mr. Karl Backhusen .................................. Bloomington, Ill.
Mr. Leonard BarnickeI................................. Milwaukee, Wis.
Miss Hannah Bendit................................... Grand Rapids, Mich.
Mr. Otto Boettger..................................... St. Louis, Mo.
Mr. Fritz Burger...................................... Kansas City, Mo.
Mr. F. W. Burkhardt.................................. St. Louis, Mo.
Miss Mary Caldwell.................................. Carbondale, Ill.
Mr. Louis Freitag..................................... Sheboygan, Wis.
Miss Julia Hanson..................................... Murphysboro, Ill.
Mr. Ed. F. Huchting.................................. Milwaukee, Wis.
Mr. Karl Heckrich..................................... Minneapolis, Minn.
Mr. Alvin E. Kindervater............................. St. Louis, Mo.
Mr. Fred Lorenz...................................... Freeport, Ill.
Miss Beulah Pope..................................... Du Quoin, Ill.
Mr. W. G. Retzer..................................... St. Louis, Mo.
Miss Daisy Roberts.................................... Corinth, Ill.
Mr. Oscar Ruther..................................... St. Louis, Mo.
Mr. John Schmidlin................................... Tiffin, Ohio.
Mr. Karl Staiber....................................... Scranton, Pa.
Mr. Curt Toll......................................... Decatur, Ill.
Miss Alma Witter..................................... St. Louis, Mo.

SOME OF THE PRINCIPLES

THAT GUIDE ME IN TEACHING

GERMAN GYMNASTICS.

BY

E. H. ARNOLD, M. D., Yale University.

(Reprinted from numbers 22 and 23 of 'MIND AND BODY'; a Journal devoted to pedagogical Physical Training; annual subscription one dollar; 468 E. Water St., Milwaukee, Wis.)
I READ this paper in answer to many queries for a statement of the principles underlying German gymnastics. Those queries emanate chiefly from those people who have been hazardous enough to adopt almost every feature of our system, even though they did not see and know the principles of it. On the other hand, this paper is to meet those of our friends who state positively that there are no principles at the bottom of our gymnastics, and that therefore there is no need of asking for them.

The trouble with both parties is mainly that they look at gymnastics from their standpoint only, and that they cannot recognize principles which treat of gymnastics from a different point of view than their own.

I shall characterize shortly two of the main directions in which gymnastic thought has been directed by our critics so exclusively that they cannot and will not recognize any thought which does not exclusively and entirely tend in that same direction.

There is, first, what I shall style the developmental school of gymnasts, that think gymnastics must look about like the following, to be up to their standard. Man is a complicated machine, the motion or locomotion of which depends mainly upon three factors: the levers (bones) on which the machine moves; the powers by which these levers are moved (muscles); and finally, the apparatus distributing and supplying fuel to muscles, the apparatus of respiration and circulation.

Having these three main factors in mind, the question was, are these factors commensurable? The question seemed to be an easy one to solve. Measuring rod, tape, calipers, the spirometer, the sphygmograph, should state all about these factors.

In order to make the results of any practical value for the work on the floor of the gymnasium, a standard of measurement had to be established as an aim at which to direct the efforts at physical development. We have seen the model man, the normal man, the average man, and the typical man, rise, and I may say, fall; for the ideas of this school of gymnastics have greatly been modified, and must in necessity
greatly modify in order to meet the demands of a rational system of gymnastics. Why so? While the figures gained by the above apparatus, and their tabulation, comparison etc. are useful and interesting in the extreme for gaining an idea of the make-up and build of the machine, they do not by any means convey any idea of the effectiveness of the machine. They do not give the truth absolute, nor relative. Why not?

Let us look at the matter of leverage. It is comparatively easy to measure the bones, but to establish the leverage we must know the exact point of origin and insertion of the muscles in question into the bony surfaces. To establish these with absolute accuracy is not only not easy, but in all cases pretty difficult, — in a good many cases altogether impossible. Our uncertainty grows as we look at our measurements of the executive powers, the muscles. In general, it is true that a big bulk of muscle means great power; but are the measurements of a muscle or a group of muscles any indication as to what power may be expected of them in an individual? Again only in a general way, but not absolute at all. The reasons are as follows:

The efficacy of a muscle depends first, on its bulk, as represented about by its transverse section, of which quantity we can judge about by the measuring tape; second, on its leverage, as established by points of origin and insertion, a quantity which we can, again, only judge about by the measuring rod; third, on the arrangement of its fibers. Of this quantity we know something in general, but for individual cases we can, once more, only judge about as to its value. The absolute truth the dissecting table only can reveal. Now last, but not least, comes the fourth factor, — viz: the innervation. This factor is so complicated a one that we may put it down as yet uncommensurable.

If these, then, are the doubtful factors which are at the foundation of our building, what kind of a building can you expect to stand upon it? And thus it is. The effort at building up an average machine guided by anthropometric hints is effective as far as giving bulk of muscle is concerned. Whether the bony levers or the leverage (insertion and origin) are changed is rather doubtful, as is a change of arrangement of muscle fibers; and finally, the innervation, a factor of the highest importance, is not affected at all by exercises as prescribed under the guidance of the measuring rod.

This is, of course, not new, even to the followers of the developmental school. They have seen the shortcomings of their scheme, and the measurements have been supplemented by tests of effectiveness of groups of muscles, and of the machine as a whole. This method must of necessity be the preferable one, if a way of correctly measuring a muscle or a group of muscles can be found. But this is not the case as yet, and will not be the case for some time, as the machinery needed for such a purpose will be extremely complicated and require for its construction a genius of no small degree.

That the fourth factor will need considering, even in the strength tests, may be illustrated by the following everyday observation:

If a man should undergo one of these tests in the seclusion of a laboratory, and then, under otherwise equal conditions, before an audience, the result will differ greatly; showing that the nervous factor differs, not only in quantity in different individuals, but in quality in the same individual. Our psychologists are busily engaged in their laboratories, trying to find ways and means by which to make this, our fourth factor, commensurable. I expect to hear something on this side of the question from Dr. Fitz of Harvard.

If this, be, then, the scientific basis upon which the developmental school of gymnasts rests its art, can it wonder that we are not willing to accept principles which are not yet satisfactorily established? Is it strange that one looking for principles of this kind in our system of gymnastics should be disappointed? Then to turn to the practical side of the question. We may well ask will exercises of other character than the ones given as so-called prescription work accomplish the same end? And if so, is the time and labor spent with prescription work not lost, if we can give exercises which serve at the same time hygienic and educational purposes, as well as developmental ones?

On the other hand, we must consider whether a developmental scheme of gymnastics, which must of necessity deal with each individual separately, will ever be practical for the people at large, and not only for higher institutions of learning? How are such factors in development as social condition going to be dealt with? (Some 20 years ago investigations were carried on by some German anthropometrists, as to the difference in development of children in cities, villages, settlements of miners, etc., showing distinctly that such things had decided effect on development.) What attitude will this school of gymnasts take towards the individual whose development is completed?

All these questions will have to be solved and answered, before into our system of gymnastics principles can find their way which tend in this direction. Until such time, the results of gymnastics on the developmental side may tell us about what mechanical work to expect of the human machinery, but cannot serve as a guide for a system of gymnastics which is intended for the mass of the people, for the school of our time, which deals with classes and not with individuals. In this it may do harm to a limited degree to an individual; but that is the way of other organizations, as the school and the state, which look out for the greatest amount of good to the greatest number, and thereby necessarily infringe upon the rights and privileges of the individual.

I shall now turn to another school of gymnastics, which I shall style the hygienic school. This title may not suit it altogether, as this school claims to be following educational pursuits too; but any one reading from its declaration of principles will find that the day's order of this school is built up on hygienic reasoning, and that the educational side is really of less than secondary importance.

The main objection of the followers of this school to our system has been that they have not been able to find any hygienic principles underlying our system. On the educational side of the question they have not attacked us, as that is not their own strong point.

I may state right here, that hygienic principles and rules are with ns of twofold value. Their positive value is that they guide us in a
general way for selecting material, but not in a specific way. Their negative value is that they serve us as contra-indications for certain forms of exercises, under certain conditions as given by different age and sex, etc. Any one who has read Dr. Schmidt’s able little book* will admit that we have hygienic principles, and coincide with me that they serve mainly as contra-indications.

If then, our hygienic rules determine for us classes and forms of exercises only generally, not in detail, nor the exercises themselves, what principles guide me in making up sets of exercises?

Before I answer this question, I must tell you why I cannot allow hygienic rules and considerations to do any more for me. I regard all exercises arranged to have specific effect on circulation and respiration as futile. I cannot assign to circulation and respiration the first place, when considering them for establishing gymnastic principles. They both serve only part of one function, viz.: nutrition. Nutrition is dependent on a good many more factors than circulation and respiration. They fulfill their mission under guidance of nervous influences. These nervous influences are of a peculiar kind. We have no control over them by will. We may interfere with the respiratory movements by will, to a certain limited degree, but we cannot willfully stop aspiration, nor can we regulate it for any length of time. Nor does our interference intercept any more than inhalation and exhalation. That is the most crude process in respiration, that might be called outer respiration. Over the exchange of gases from air in the lung to the blood, middle respiration, nor over the inner respiration, i. e., the exchange of gases from blood to tissue, and vice versa, we have no willful control whatsoever.

If this be true of respiration, it is equally and much more true of circulation. Over this we have no willful influence, if we exclude the interference of willfully regulated respiration and its effect on circulation by way of thoracic aspiration. Both apparatus are self-adjusting, self-regulating, not only as far as rate of speed and capacity is concerned, but different reserve forces are called into play. Our heart dilates, hypertrophies under some forms of exercise temporarily, to contract and atrophy after the condition calling for the first change has disappeared. Indeed, the apparatus is working automatically, adjusting itself to the conditions of health and even of disease, with the utmost facility and accuracy.

What then, of efforts of improving upon this automatic adjustability by exercise for which a specific effect is claimed? An effect which must of necessity be different in each individual. Nor can the followers of this school claim that the specific effect is had, even in general, as tabulated by them. I recall to you observations presented to you at our last meeting in New Haven,** by Dr. William G. Anderson, disproving the claim that slow leg movements decreased the heart’s actions.


** Convention of the American Association for the Advancement of Physical Education.
our gymnastic system by increasing their function in a general way, leaving the regulation of their activity to the apparatus provided for that end; and are honest and modest enough to admit that we, with our present limited knowledge, know of no means by which to alter or improve this apparatus. Our hygienic principles are really of negative value, inasmuch as they serve us as contra-indications, as before said. Therefore you perhaps will understand now why we have been accused of having no principles (i. e., hygienic principles) underlying our system of gymnastics.

After having told you why we cannot and do not work on these two bases, I shall try to sketch in gross outline some of the principles on which we—or at least I—am basing the German system of gymnastics. With me, gymnastics is mainly an art, or a science, if you wish, which teaches the use of our muscular apparatus in the most efficient way; i. e., adjust motion and locomotion so that the greatest amount of work may be done with the smallest expenditure of force. The two elements which are concerned in performing such work are the muscular and the nervous elements. Each movement is, in the first place, a mechanical problem. The given factors are weight, the resistance to be overcome, and space, the way or distance which the movement is to traverse. In order that this problem be solved so that just sufficient muscular force be expended and no more, the first thing necessary is that we have a correct appreciation of both factors, weight and distance. To gain this, a receptory apparatus is presupposed, consisting of the senses of sight and touch.** You all are, very likely, well acquainted with the very complicated way in which we learn to judge of distance; how the sense of sight, of itself, is unable to convey the idea of distance or dimensions; how the sense of touch, and that as yet not well-defined part of it called muscular sense, must combine and tell of their experience as regards the resistance met, contraction necessary, etc., in order to fetch a certain member of the body to a certain point of view; how we must memorize that a certain contraction of the ciliary muscle was necessary in order to adjust the lens; how certain recti and oblique muscles of the eye had to contract in order to bring in view a good distinct picture of a limb so moved; how the experiences so gained have to be stored, classified, compared, combined; how they are latent and become kinetic when there is need of it. The process of learning to appreciate weight is of course a similar one. It is plain that, before we can commence to judge of distances between things other than ourselves, and of weights and resistance of foreign bodies, we must learn of the distances and dimensions of our own body and the relation of the different members to one another; and likewise have we to learn the weight of our own body and its members before we can learn of the weight of foreign bodies. This teaching, of course, commences with the first day of our life, and goes on at a very rapid rate in youth.

Yet this natural method of teaching is not sufficient, is in a great many things, if not altogether incorrect, only approximately true. And so I regard it as the first step in educational gymnastics that correct ideas of these conditions and relations of the body and its members be gained, that the receptive apparatus be taught to make correct observations; that the centers classify and store them properly; and finally, that these latent experiences be, at the proper time, compared, combined, and discharged as impulses in the way that is wanted. That is to say, that at the same time that we teach the executive powers we teach the receptive powers, and this lesson in coordinate movement, for a certain purpose, in a certain way.

We begin, then, with what is termed free gymnastics; i. e., gymnastic movements of the body and its members, pure and simple. The teaching must begin to repeat a commonplace, with the simple. As we can concentrate our attention for correct observations only on one thing at a time, we must begin to move a single part of the body only, at first. We move our motile apparatus in its joints in all the possibilities of the joint, and thereby get certain kinds of forms of movement. Flexion and extension, raising and lowering, rotating, etc., are these fundamental forms, which offer mechanical problems that differ in the factors weight and distance.

How do we go about the teaching of these single movements of a single part of the body? Do we move, for instance, the arm as a whole first, or do we commence with the movements of the wrist and fingers? We teach movements of the limb as a whole, trunk as a whole, etc., first. Why? Because the acuteness of perception of differences of pressure decreases with too great and too small weights offering resistance. Thus while an arm or a leg, when moved into different attitudes is large enough to be accurately perceived, the fingers, for instance, would offer too small difference in weight for accurate perception.

To what degree is a motion in a joint to be taught at first? To its full extent, for the sense of sight perceives large differences of extent in motion with more accuracy than of very small ones. Do we execute at first very quickly or very slowly? With moderate swiftness, for the above reasons. These are the reasons we do not teach fine positions of hand, wrist and fingers, like Delarueans, nor partial trunk movements, like our Swedish friends, until our pupils are advanced. We teach them, as the first step, gross movements of one limb as a whole, to the full extent of mobility in its joints, with moderate celerity. As movements in the different joints are possible in different planes, we must determine whether there is any difference in difficulty of execution in the different planes.

This brings us to the matter of directions. The senses which have mainly to do with the adjustment of coordinate motion, sight and touch, point forward. It is therefore easily explained why coordinate motion should be easiest and most accurate of execution, in the forward direction. To discern things on either side of us by either senses asks for complicated muscular movements. The eye, respectively the head,
have to be turned in order to gain distinct pictures of things on either side of us. That part of the tactile apparatus, viz.: the fingers, respectively the hands, hang down by the side; but the finger tips, which are on the anatomical front side of the hand, need turning, the arm raising, in order to gain knowledge of the bodies on our side. The number of tactile corpuscles is greater on the front side of the body. That means greater facilities for movement forward, less for the side. The rear side of our body is not fitted out with special senses. The tactile corpuscles are few and far between, the facilities for accurate movement backward are few, coordinate motion backward is most difficult.

Not only are the facilities in the way of direction and supply of sensory apparatus graded in this way, but the possibility and range of motion is in general arranged on the same plan, viz.: greatest forward, sideward less, backward smallest. This is in some instances not very apparent, nevertheless true. If in simple movements of one member of the body only, this gradation does not show very plainly, that is no doubt due to the fact that a child that enters school has had a certain amount of training in coördination, with nature as a teacher. But as soon as we commence to combine movements, the value of the above gradation will at once be seen. Is it at all necessary to combine these moves performed sub-consciously, automatically, or by reflex, in muscular matter, but a great deal more shying can and must be done of nervous matter. It is at once apparant that, if, for life, they would suffice. But life offers us continually new coördination problems which are complex and combined movements. This is one reason why we must combine. Another reason is this: it movements are to be done in the most economical way, the saving must not only be in muscular matter, but a great deal more saving can and must be done nervous matter. It is at once apparant that, if, for the coördinate movements, the whole nervous apparatus had to be moved, that is to say, that it would require for every new movement and its repetition a distinct reasoning process and an act of volition, we would never have time to think of anything but movements, and mental growth would be impossible. It is easily seen why it is then necessary to exclude certain nervous processes from such movements by having these moves performed sub-consciously, automatically, or by reflex. How is this to be attained? By establishing what may be styled a muscular memory. That is to say, certain solved coördination problems must be stored in our mind so that when time and occasion offer they may be reproduced in their already solved state. How can such a memory be gotten? By often rhythmically repeating simple forms of exercise that have first been executed by command. Here we differ with schools who command every move, thereby preventing the creation of such muscular memory, and wasting a great amount of volition power which might be used in other fields of activity with great benefit. After such a memory of simple forms of movements has been established, i.e., after these moves are automatically performed with accuracy, then comes the time for the second manner in which to make moves sub-consciously; viz.: combination of simple moves.

Under what rules are exercises combined? you may well ask; for to him who is a casual observer only, and looks at exercises performed in a German gymnasium, it does not seem that they are combined according to any rule whatsoever; and he could style them, with our friend Professor Mosso, a conglomerate. I shall try to prove to you that they are combined under well-defined rules.

As a matter of experience, it may be stated that it is easier to move two like parts of a body in a certain way—for instance, two arms, two legs; next comes the combined moves of two unlike parts—one leg, one arm, arm and head, trunk and leg. As far as the exercising of the extremities goes, unlike parts of the same side can be worked easier than unlike parts of unlike sides. The construction, position and arrangement of the cerebral and spinal centers and conducting apparatus makes this plausible enough; a communication of the centers being proved by the fact that after operations on the brain, when parts have been removed or destroyed, and paralysis of a group of muscles follows, that the center commonly attending motion of the other side may supply both sides with the necessary motor impulses.

But the subject of combining exercise is not solely governed by this factor; directions play an important role. It is easier to move two parts in like directions, more difficult to move them in opposite directions, and most difficult to move them in different directions. That is to say, two arms may be moved easiest forward, it is more difficult to move one arm forward and the other backward, most difficult to move one arm forward and the other sideward. The fact that like movements of some parts in some directions are of course attended to by the same set of muscles, movements in opposite directions by antagonistic sets, movements in different directions by groups of muscles that have no such relation, is no doubt the reason for this fact, which is a matter of experience on the floor of the gymnasium.

It may again not be apparant in combined movements of only two members, on account of the above mentioned natural teaching of coördination already had by the young gymnast, but is plainly brought out by combinations of a higher degree, where we find that the gradation holds good as far as accuracy of degree of motion, its swiftness, etc. are concerned. Combined forms of movements become executable in that order, in rhythm sub-consciously, automatically. The number of errors occurring in the different forms cited increases in the order named.

All these reasons, although only empirical, have proved the point to my satisfaction. If you, who have the time and occasion to work in psychological laboratories, will set to work to test these assertions by scientific apparatus and in a scientific way, I have no doubt that although I may by your researches be corrected in detail, I am not going to be found at fault altogether.

But the subject of coördination is not exhausted with the matter of directions. The forms of movement come in for consideration, and form. If a scale put down for directions is to be used, the forms of like forms—for instance, raising, to be easier of execution, and what has been said of innervation will explain this fact. Next in difficulty range opposite forms of movements—for instance, raising and lowering,
I base this observation on the principle that a coordinate motion carries its own impulse for reversion; an act of will is only necessary to set the time when reversion is to take place (when exercises are executed by command); and then this act is not one of conscious volition, as long as the exercise is performed rhythmically. When we consider that a coordinate motion is for its degree of accuracy and swiftness dependent, not so much on the action of the muscles directly performing it, but on the antagonistic group participating in the move in the way that we may, with our Swedish friends, style eccentric; then it may easily be seen why these muscles should, through this partial contraction and relaxation, receive the stimulus which would tend to their complete contraction or relaxation, i.e., the reversion of the original motion. Naturally gravity will always be a stimulus for the reversion of motions which must be considered, and will explain the gradation above established.

These reasons explain, too, why different forms of movement—by, for instance, the raising of one arm and the carrying of the other arm through a horizontal plane from right to left—are most difficult, and therefore stand at the top of our gradation, for they profit not by the same innervation, as cited for exercises of the same form, and the impulses for reversion are here, instead of a help, a resistance to the motion.

We do not stop at combining the movements of two parts of the body. We may execute a move of the head, both arms, the trunk and both legs all in the same, opposite, or different directions, in the same, opposite, or different forms of movement which represent the highest grade of coordination problem that we are able to give.

These are the principles that guide me in teaching German free gymnastics. Any one who sees these complex forms of exercises may think them useless, a mere conglomerate of positions and moves, theatricals; and yet they are necessary for making complex coordination subconscious, automatic, reflex, if such is possible, and yet accurate in degree and swiftness. A person who can execute such a complex movement in short time, with accuracy, and perform it rhythmically, without error, may well be said to have control of his body; and as he is working with the least amount of nervous force, volition being gradually reduced and excluded, he is performing it in the most economical way.

These principles hold good for marching, running, jumping, and apparatus work; and I find that since I have graded and arranged my work according to this idea I have less correcting to do, execution of exercises is more accurate, I have to do less chiding, as errors are less in number, as now I can explain errors and attribute them either to my teaching, to the subject matter of teaching, or to the inattention or bad will of the pupil. Discipline has thus been greatly simplified.

I have arranged a progressive table of free gymnastics embodying these principles, but it is of necessity such a lengthy affair that I shall not try to give it to you to-day. Neither shall I attempt to recite to you the principles that guide me in teaching jumping, apparatus work, games, etc., as I fear I have already taken too much of your time; but I shall be only too glad to do so at the first opportunity offered me.