The New Psychology and Harvard's Equipment for Teaching It.

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(Return to *Classics* index)

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The upper room of Dane Hall, in which for so many years the Law School carried on its quiet work, has recently become filled with noise. Electro-magnets snap, tuning-forks resound, the chronoscope whirs, -- hammering and sawing are heard, and the discussions there are now no longer concerning legal cases and decisions, but rather concerning sensations and ideas, feelings and emotions, motives and will. Over the door, meanwhile, stands in large letters: "Psychological Laboratory."

What has Psychology to do in a laboratory? What part has she in instruments and experiments? I am now used to this question. In the two months that I have been in America, with the exception of the two leading questions as to how the climate of New England pleases me, and whether we play football in Germany, I have heard no other question so frequently. Now some one with a supposed knowledge of the facts adds as a conjecture, that Experimental Psychology treats of spiritualistic experiments; while another, without asking, presupposes that [p. 202] nothing less than vivisection is in question. Both are wrong. Vivisection, and still more spiritualistic experiments, are totally excluded from the psychological laboratory. And yet these laboratories have never had to complain of a scarcity of material on which to work.

Psychology has, in fact, no lack of weighty questions, which can be answered by experiment alone. What she does sometimes lack are, rather, well-lighted rooms of proper size, suitable apparatus sufficient for the highest demands made upon it, professors who can devote their whole time exclusively to Psychology, and who are not compelled to scatter their energies in philosophical instruction, students who are inclined to devote to such work at least several hours daily, and finally, the sympathizing interest of the academic public. Thus far, at no time and at no university in the world have the first four conditions been simultaneously so well fulfilled as at Harvard. We have fine laboratory rooms, we have the most ample and complete collection of psychological apparatus in the world, we have three instructors exclusively for Psychology, and have, in addition to the average of fifty students who are engaged in the course of laboratory practice, a dozen young men of advanced standing, most of whom spend

the largest part of their working hours upon investigations in the laboratory. Is it possible that under such happy auspices the last-named wish of the psychologist is to remain unfulfilled? -- that our common work is to remain without the sympathetic interest of the academic public? But interest can be developed from knowledge alone. Once more then: What has Psychology to do with a laboratory?

Twenty years ago no psychologist had as yet established a laboratory, though many had desired one. Fifty years ago such a desire would have been almost incomprehensible. And yet even then Psychology had long outgrown the stage of being a mere metaphysical speculation concerning the essence of the soul. Empirical investigation into the real phenomena of consciousness, an investigation which was originally of service only to Philosophy, had long since become the chief undertaking of Psychology. And as the natural scientist investigated natural phenomena without making use of metaphysical speculation about the essence of matter, so could the psychologist study the phenomena of consciousness [p. 203] without regard to philosophical theories of the soul's essence. Then, however, came the time in which, chiefly through the influence of physicists and physiologists, -- let one but recall Helmholtz, -- there followed a most significant advance in the physiology of the sense-organs, of the nerves and of the brain. A realm of facts important to Psychology was thereby disclosed to which the psychologist was obliged to turn his attention the more joyfully, since here at last that mathematical accuracy was to be hoped for which to mere self-observation seemed denied. Together with the study of those processes such as memory and fancy, reflection and will, which every one can observe only in his own consciousness, it was needful now to study also the relations between the outer processes and the inner states. In 1860 appeared Fechner's "Psychophysics," which, in the interests of Psychology, endeavored to deduce mathematical laws for our sensations from the experimental data of physicists and physiologists. But from yet another quarter Psychology received a fresh impulse. Astronomers had noticed that different observers registered with different degrees of rapidity the passing of a star over the cross-thread of the telescope. Their attention was thereby called to the fact that even the simplest mental processes demand a certain time, and in the interests of astronomy they began experimentally to measure this time-length. Once more, then, the psychologist was enabled to obtain valuable results in a realm of exact investigation.

But is Psychology indeed to live only on the crumbs that fall from the table of the physicist, the physiologist, and the astronomer? Must she not herself begin at last to measure the duration of mental acts and to study the dependence of our sensations upon outer stimuli?

With this in mind, Wundt, in 1878, founded in Leipzig the first laboratory for Experimental Psychology. But let a special workshop once be established, and then the method of experiment is sure to he applied beyond the limits set by Fechner and the astronomers. To experiment is indeed only to observe under deliberately chosen artificial conditions. All that which is accessible to self- observation, or to the observation of others, is therefore treated experimentally so soon as we artificially bring our own or another's consciousness under conditions which facilitate [p. 204]

and improve the observation of particular processes. So then in Wundt's laboratory there soon arose work upon the connection **of id**eas, upon memory and attention, and upon the perceptions of space and time.

Wundt's school spread the impulse farther, and that not alone **in G**ermany. Stanley Hall and Cattell were the first to bring **the** Leipzig acquisitions to America. In Europe, under the **press**ure of limited financial means in the universities, the pro-**cess** was but slow. From amongst Wundt's pupils, Martius **esta**blished a laboratory at Bonn, and I myself at Freiburg in **???en**. Small laboratories, really serviceable for nothing but **prac**tice, arose gradually in Berlin and Copenhagen, in Bern and **Groni**ngen. In recent year promising institutions have arisen in

Paris, Göttingen, and Geneva. Similar ones in Oxford and Edinburgh are mere questions of time. American made the most rapid progress. New York and Philadelphia, Worcester and New Haven, Providence and Ithaca, Madison, Wis., and Champaign, Ill., have laboratories more or less richly equipped. Last year, Harvard University, where, under the influence of William James, Psychology has long been in special favor, likewise did ???tice to this demand of science. Ours is the richest establishment, but now no longer the youngest. This prerogative belongs to Chicago, though possibly for only a short time.

But with the advancing establishment of laboratories the science also has advanced. Not only is it true that constantly better methods and more exact apparatus are devised for answering the original questions, but the circle of questions itself has with astonishing rapidity widened out from year to year. From the simplest elementary processes which were subjected to experiment, the science advanced first hesitatingly, then boldly, to higher and higher mental functions. Only a decade ago psychologists became weary of the monotony of such experiments as were concerned for the most part with Fechner's Law and the time-measurements of elementary acts. To-day we know scarcely a single realm of the mental life into which with rich success experiment does not dare to go. Who shall set the limit? To show the significance of the experimental method for the highest and most complicated phenomena of mental life, has come to be to-day exactly the goal of our labors. In the series of scientific investigation [p. 205] now begun in our youthful laboratory the questions concerning elementary time-measurements and sense impressions take a place far behind the study of the combination and fusing of ideas, of process of thought and acts of speech, of space and time perception, of memory and attention, of feeling and will.

A stroll through the workrooms, even outside of working hours, permits one to see clearly this high development from a glance at the apparatus stored in the glass cases. Four great groups of contrivances call thereby be easily distinguished. First, the apparatus intended to illustrate the relations between mind and body through representations of the brain, nerves, sense-organs, etc. Costly models of the brain, eye, and ear, all with detachable parts, valuable models of nerve paths, fine preparations in wax, dissected parts in alcohol, etc. -- all are here. Here belongs also the anatomical diagrams and the histological nerve-preparations with excellent microscopes. All this has significance for demonstration only, and accordingly has nothing to do with the experimental problems proper. The three remaining sections are for that.

In extent the section for the psychology of the senses is by all means the most imposing. Eye and ear have equal recognition. A copious collection composed of tuning-forks, an organ, a harmonical, pipes, resonators, etc., etc., serve for psychological acoustics. Color-mixers of various sorts, costly prisms, apparatus for after-images and color-blindness, a dark room, perimeters, etc., serve for psychological optics. And yet the lower senses are not forgotten. Complicated touch and temperature apparatus, and instruments for the study of sensations of movement and pressure belong as well to the list.

Of greatest value is the incomparably rich collection of instruments belonging to the third section. They serve for the time-measurement of psychical acts, from the simplest impulses to the most complicated processes of judgment. Here the methods used gain constantly in value. They allow us to estimate most minutely distinctions which are inaccessible to self-observation, and the more their resources are developed, the deeper the glance we gain into the structure of the mental organism. Our clocks have somewhat the same function as the microscopes of the anatomist. With his microscope he can distinguish the thousandth [p. 206]

part of a millimeter; with our chronoscope we can measure the thoudsandth part of a second. But every question craves new ????nces, and so, together with our valuable clocks, we find ????t kymographs, instruments for reaction, and registering ????forks of every sort. In this section almost nothing is left

????esired.

The fourth section is included all that apparatus which serves ????vely for the investigation of higher mental processes, such as the perceptions of space and time, memory and attention, ????tion and formation of jugments, discrimination and ????. These stand in the foreground, but feelings and emotional impulses and acts of will, are also accessible regions. ???? here the newest instruments show their power. Apparatus for the study of the æsthetic feelings or the expression of the ????ons, and much that is similar, has just now crossed the ????. It is exactly in this department that the tiny mechanical workshop of our laboratory has proved most useful. Copious supplies of wood and glass, of brass and cotton wadding, of all ????ties of paper and iron tools, or wires and tubes, and of ????ical and chemical paraphernalia, enable us continually to ????t the instruments to our questions. Such is our laboratory ???? an expenditure of over four thousand dollars, equipped in ???? best possible manner for the carrying on of its difficult questions.

????hall it therefore be said that no urgent needs still remain?

On the contrary, whoever has undertaken psychological investigations on the corner of Harvard Square, at a place where the electric cars cross from four directions, and where the hand-???ans of the whole neighborhood make their *rendezvous*, -- out of his soul will not vanish the wish that a new laboratory may one time arise in a more quiet spot. Of still more importance, however, is it that our equipment is of course never complete. ??? so young a science, which is daily making conquests in new regions, to stand still means to fall behind .Only when the laboratory shall be able, with new equipments, to follow up every new turn of Psychology, will Harvard be able to continue in the leading rôle.

But another point remains. Our laboratory has thus far, together with nearly all the rest, confined itself in the main to [p. 207] psychological experiments upon normal adult men. And that must, indeed, remain its chief aim. But related problems can also come in. Just as experiment is not the only method of the psychologist, but rather as ordinary self-observation and observation of one's fellow-men, of children, and of the insane, and as the study of historical movements, of poetical works, and of social statistics, must continually support and supplement experimental work; so is the investigation of normal adult men by no means the only possible form of psychological experiment. Granted I that experiments on children and on the sick, and perhaps even on hypnotic subjects, can for practical reasons be better carried on at home and in the clinic than in the psychological laboratory, at any rate experiments on the mental life of animals would be in the highest degree desirable. From the microscopic infusoria in a drop of water to the highest animals, one may investigate the mental functions by means of systematic experiments. With no cruelty to animals, that not difficult task might be carried on in a special portion of the laboratory; but it is clear that new and extensive means would be necessary.

The work of the laboratory has naturally a double character. First in connection with the lectures, there are beginner's courses in demonstration and laboratory practice. All this is under the able direction of Dr. Herbert Nichols. Second, there are for the more advanced students new investigations which demand the greater part of the time. Regular work is carried on daily from ten to one, and at various hours in the afternoon. The graduate students, who are already proficient in Psychology, have, therefore, no mere practice work to perform, but are engaged in new investigations. My idea is that only through special experimentation, and not through mere

repetition of what others have already thought and accomplished, can we become men of science, -- not to mention the fact that this is essentially the more interesting course. We must have made contributions to a science in order to understand its deepest meaning. I am aware that in Germany this principle is often exaggerated; and there the instruction suffers from the one-sided training of far too highly specialized investigators. What is needed is the combination of the American University system, which lays far too much stress upon instruction, with the German system of original research. [p. 208] Experimental Psychology is just the subject that easily permits this union, since every new investigation demands only one man as director, but many as subjects. Thus each man can act as investigator, conducting perhaps for two days in the week an original research, and at home studying the literature connected with it. On the remaining days, however, be acts as subject in the investigations of his fellow-students, and thus has an opportunity to gain a practical knowledge of investigations in the various fields. Thus at present, by carrying on work simultaneously in different rooms, we have fifteen new investigations already under way selected from almost every region of Experimental Psychology. Some of the lesser tasks will terminate after a few months, and be ripe for publication. Then new themes will be taken up, and so the experimenting will proceed, while all one-sidedness and monotony are avoided.

But who, then, are the students for whom such psychological work comes in question? Are they only future professors of Psychology? Whom else does all this concern? I might perhaps more simply ask: Who is there whom all this does not concern? Certainly those who wish to devote themselves especially to Psychology and Philosophy will always select for themselves this most-engrossing work; but the conviction is growing with surprising rapidity that other departments ought not to hold back, unless they wish to forfeit the greatest practical advantages. Science certainly has not to run after practical benefits. Just as the chemist examines his materials theoretically without asking whether they are poisons or means of nourishment for the body, so the psychologist has to investigate the phenomena of consciousness without considering side issues. But the history of science shows that those departments have always developed most richly which have been serviceable to practical life. And could that ever be said of a science more than of exact Psychology?

How can a teacher rightly train the minds of youth, if he does not understand the structure of the mental life? How can the judge estimate mental acts, how can the preacher influence the spiritual life, how can the statesman understand social needs, if he has never taken the pains to comprehend the laws and the phenomena of mind? And there is no danger that the highest dignity of our mental life will suffer injury from this study, or [p. 209] that our moral strength and our æsthetic treasures will be destroyed, when science shall teach us how to understand even the most subtle processes of our soul-life. Just as the admiration of nature becomes constantly more intense, the deeper natural science penetrates, so will mental life grow in dignity the better we learn to comprehend it. And shall I, in conclusion, be silent over the immeasurable significance which exact Psychology has for the natural scientist and the physicist, but above all, for the physician? That physician remains but a dilettante, who will judge the diseased mental life without having studied the same in health. Experimental Psychology stands thus midway between the sciences of mind and of nature. It is thus rightly the unifying central science; Or rather, I would say, it ought to become this central science. Yes, it ought to become that, it can become that, and it will become that, when the universities rightly understand its true advantages and their highest duty.

Hugo Münsterberg.

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