

variety—was hailed after World War I with as much hopeful enthusiasm as an older generation had received the new psychology after the Civil War. Then, what was new about the new psychology was its experimental basis, and experimentalism—according to the received wisdom—began in Leipzig, Germany.

CHAPTER 2

The Rise of Experimental Psychology

[Psychology is passing into a less simple phase. Within a few years what one may call a microscopic psychology has arisen in Germany. . . . This method taxes patience to the utmost, and could hardly have arisen in a country whose natives could be bored. Such Germans as Weber, Fechner, Vierordt, and Wundt obviously cannot; and their success has brought into the field an array of younger experimental psychologists, bent on studying the *elements* of the mental life, dissecting them out from the gross results in which they are embedded, and as far as possible reducing them to quantitative scales. . . . There is little of the grand style about these new prism, pedulum, and chronograph-philosophers. They mean business, not chivalry.

—William James
The Principles of Psychology (1890)

We ought never to doubt that Humanity will continue to produce all the types of thinker which she needs.

—William James
"A Plea for Psychology as a 'Natural Science,'" *Philosophical Review*
(1892)

Although Titchener regarded Wilhelm Wundt "the founder, not of experimental psychology alone, but of psychology,"¹ Leipzig was hardly the first place psychology was studied. It was, however, where psy-

chology was initially manufactured. The central role accorded Wundt in the development of the modern discipline derives not from any scientific discovery that bears his name eponymously but rather from his heroic propagandizing for experimentalism.² He organized the first disciplinary pursuit dedicated to the analysis of a clearly defined set of problems and certified doctorally a professional progeny capable of perpetuating his research agenda.³ Wundt's career is worth examining briefly, for his endeavors significantly shaped the rhetorical contours of the new psychology in America.

When Wundt was twenty years old he matriculated in 1852 at Heidelberg, where, intent on a medical career, he studied anatomy, physiology, chemistry, and *materia medica*.⁴ Four years later he shifted his vocational interests from medical practice to physiological research and journeyed to Johannes Müller's famed Berlin institute. Returning to Heidelberg, he completed his requirements for the M.D. degree but became *Dozent* and later *extraordinarius* in physiology. In 1858 Herman von Helmholtz arrived at Heidelberg, and Wundt worked under the celebrated experimental physiologist for thirteen years.

In 1873, two years after his failure to obtain Helmholtz's vacated chair, Wundt published the first half of his *Grundzüge*. What he had done in this work was to select those psychological problems which emerged in the course of physiological investigation and then fuse them with the epistemological questions that derived from the associationist tradition of philosophical psychology. Associationists argued that complex mental phenomena could be reduced to sensations, the repetition and compounding of which produced ideas. As early as 1749 the British empiricist David Hartley had furnished associationism with a systematic if speculative physiological basis. A century later Alexander Bain had provided associationism with a refined sensorimotor perspective. By establishing experimental conditions under which stimuli could be controlled and sensation measured, Wundt sought to make psychology an exact science. His effort was rewarded in 1874 by a call to the chair of inductive philosophy at Zürich. The next year, following the publication of the second half of his *Grundzüge*, he accepted the chair of philosophy at Leipzig. There he established his Institute of Experimental Psychology, thus founding, in a very real sense, the modern discipline of psychology.

The Foundations of Experimentalism

Intellectual and ideological imperatives as well as institutional mobility played a part in Wundt's transmutation. His call for a systematic experimental psychology must be seen within the philosophical and scientific context of the debate between vitalists and reductionists in biological circles. In the early nineteenth century, German idealists attempted to reunite the noumenal and phenomenal worlds that Kant had dichotomized on logical and epistemological grounds. The paucity of knowledge about the nature of certain physiological processes encouraged them to postulate the existence of a vital force immanent in the natural world and directing it toward the gradual unfolding of some higher spiritual purpose. Explicit in the work of the embryologist Ernst Haeckel, this *Naturphilosophie* provided teleological explanations for biological processes and led to conclusions potentially damaging to the stature of university-based natural scientists.⁵

In the 1840s Emil du Bois-Reymond and Ernst Brücke, representing a new breed of experimental physiologists trained by Müller, undertook a reductionist campaign against vitalism.⁶ In 1847, Helmholtz, another Müller student, published *On the Conservation of Force* in which he brought physiology under the canopy of theoretical physics and viewed the entire world, including living beings, as a closed physical system.⁷ He argued that to assume such a force as psychic power distinct from physical energy was to violate the principle of "closed physical causality" and to undermine the possibility of reducing the phenomenal world to a predictable, law-bound order. In 1848-49, du Bois-Reymond identified the vital force of *Naturphilosophie* with negative electrical waves.⁸ In the 1860s—by which time Wundt had been trained by Müller, du Bois-Reymond, and Helmholtz—*Naturphilosophie* had been effectively repudiated.⁹

This is not to say, however, that the idealistic underpinnings of that philosophy gave way under the pressure of mechanistic reductionism.¹⁰ In common with most German intellectuals, Wundt subscribed to the view that the activities of the mind determined the structure of physical reality. He was unwilling to accept the deterministic implications of reductionism that would seem to deny free will and human responsibility. For centuries Cartesian dualism—the doctrine that matter

is extended, divisible, law-bound, and inert and that mind is unextended, indivisible, free, and active—protected cherished notions of voluntarism. Even Johannes Müller, the "father of experimental physiology," found it difficult to discard dualism. When Müller elaborated Charles Bell's ideas about specific nerve energies in his classic *Handbuch* of 1838, he claimed that the "fibres of all the motor, cerebral and spinal nerves may be imagined as spread out in the medulla oblongata, and exposed to the influence of the will like the keys of a piano-forte."¹¹ Mind remained the musician; and mind's cortical organ, the brain, was excepted from those physicochemical laws developed to explain sensorimotor action. As Geoffrey Jefferson put it, "The hemispheres were the seat of the 'will': they excited movements by playing on these motor mechanisms. But how they did no one knew and no nice man would ask."¹² By the last quarter of the century, however, the law of the conservation of energy, the demonstrable fact that the cortical areas responded to stimulation, and the theory of evolution that discounted the notion that mind could be somehow "superadded" to the biological organism forced psychologists to attend to the findings of neurophysiology. The institutionalization of experimental physiology that threatened to abolish dualism necessitated the invention of an experimental psychology to defend it. Wundt would plead the case for "psychic causality" (and hence for idealism) in rigorously experimental terms, thus borrowing not only the methods but the prestige of modern physiological science. Wundt, the experimentalist, eschewed the "grand style" of philosophical speculation that James admired, but he nevertheless intended a very precious chivalry.

Wundt maintained the familiar doctrine of psychophysical dualism according to which physical and psychological processes are held to be distinct and inexplicable in terms of each other. Psychology, he argued, differs from physiology because it considers different phenomena from a different point of view. Physiology deals with the phenomena of the external "mediate" world, whereas psychology concerns itself with "the facts of immediate experience in relationship to the perceiving subject himself."¹³ Physiology seeks to discover the physical and chemical connections between objective occurrences within the neuromuscular system and sees human behavior as a physical phenomenon objectively describable. Introspective analysis of consciousness,

however, illustrates that the connection between elements of a subject's "immediate experience" is explicable not in terms of physicochemical relations but in terms of the subject's motivation. Psychology seeks to explicate the subjective aspects of human experience by viewing it as

a succession of representations of movements [not, in other words, of movements themselves], together with feelings, sensations, and representations of ends which precede the action as motives—elements all of which are immediate contents of consciousness. Since these contents constitute a connected whole . . . we get here a purely psychological causal connection which, like the purely physiological one, is homogeneous.¹⁴

Because psychology deals with the actual material "which our own consciousness presents to us" it is, according to Wundt, concrete and phenomenal. Physiology, on the other hand, succeeds by ruling out the subjective from experience and so is "abstract" and "conceptual."¹⁵ While Wundt does not defend the ontological dualism of mind and matter, he can still maintain that psychology represents an autonomous field because of its distinctive viewpoint. Nevertheless, as Theodore Mischel has perceptively pointed out, Wundt adheres to the essential feature of Cartesianism: the notion of "an 'inner' realm that is epistemologically and psychologically prior to the 'outer' physical world."¹⁶ In this respect, Wundt's conceptualization does not differ significantly from the philosophic tradition of commonsense psychologizing. What makes Wundt's systematic psychology innovative is his assertion that the introspective and fundamentally private examination of subjective experience can be transformed into an objective science by using experimental methods developed by physiologists to study the senses.

This is why Wundt christened his new science "physiological psychology." Procedurally it differs little from what went on in the physiological laboratory, including controlled introspection. Ever since Bell and François Magendie discovered the functional distinction between sensory and motor nerves, the physiology of movement had progressed more rapidly than the physiology of sensation. It was relatively easy to map motor centers along the neural axes of experimental animals by stimulating certain points and monitoring resultant muscular responses. But animals could not describe the sensation occur-

ring during such procedures. The study of sensation was therefore preoccupied with the physics of the sense organs.¹⁷ In experiments on vision, for example, the physiologist knew the physical properties of light waves and of optics and the anatomical aspects of the eye. But, in order to monitor sensation in physiological terms as an afferent neural process, one had provisionally to describe it in psychological terms as an experience: mixed red and yellow lights *look* orange. Since this introspectively derived fact had to be taken into account, it had to be controlled.

Wundt sought to study the psychological perception, not the physiological sensation, and reasoned that the experimenter could stand the physiologist's approach on its head and procure an experimental psychology. Instead of using the subject's account of alterations in his "immediate experience" to help study the physical aspects of sensation, the psychologist could deliberately and measurably alter the sensory stimulus in order to monitor what was happening in one's consciousness. According to Wundt, what prevented the "armchair" variety of psychological introspection from becoming a genuine science was its incapability of controlling external stimuli and, therefore, of artificially reproducing an identical conscious experience that, though subjective, could be compared with the private experiences of other trained observers. An experiment, we may recall, is simply an observation that can be isolated, repeated, and varied. If psychology could duplicate discrete existential experience, then it was entitled to be called an experimental science. Sufficient comparisons would permit generalizations from which would be extrapolated the laws of mental life.

In order to provide introspection with objective controls, Wundt relied on two basic modes of investigation: the reaction-time experiment based on the physiological procedures of Helmholtz and the psychological methods based on the midnineteenth-century mathematical constructions of Gustav Fechner and Ernst Heinrich Weber. Helmholtz had succeeded in measuring the speed of the nervous impulse and hence the time taken for a subject to respond to a simple sensory cue; that is, the time required for the nervous impulse to travel through the central nervous system and then to the motor nerves, provoking muscular reaction. The cues, of course, could be made complex. The experimentalist might, for example, direct the subject to respond not

merely to any flash of light but to one of a certain color, intensity, or duration. Or the subject might be required to involve two senses by attempting to determine visually the position of a pendulum when a certain sound occurred. By complicating the sensory stimuli, Wundt hoped to isolate times involved in those mediating processes of association occurring within the central nervous system and then to determine through introspective analysis the nature and role of such conscious phenomena as attention, judgment, memory, and inference. The psychologist would employ such physiological apparatus as audiometers and spectroscopes to control the stimulus and chronoscopic devices to record actual reaction times.

Although one could not measure a thought, one could measure stimuli and, indirectly, sensation. In his 1860 monograph, *Elemente der Psychophysik*,¹⁸ Fechner expressed the mathematical relation between stimulus and sensation. E. H. Weber had earlier concluded that a subject successively lifting a set of objects of gradually increasing weight (0^1 , 0^2 , 0^3 , . . . 0^6 . . .) would fail to perceive the difference between, say, 0^1 and 0^2 . The "just noticeable difference" might arrive only with the hefting of 0^6 . Weber suggested that the perceived change was proportional to the effect of the prior stimulus; developed a mathematical ratio for expressing this relation; and applied this "law" to auditory, visual, tactile, and thermal discrimination. Fechner developed Weber's findings into a law that stated that the strength of a sensation is proportional to the logarithm of the stimulus and, remarkably, into an idealistic philosophic system that attempted to express the relation of mind to body. The technical achievements and limitations of psychophysics need not concern us here. What mattered was the operational translation of "sensations" into reactions that were susceptible to objective investigation and expressible in precise quantitative terms. Psychophysics and reaction-time experiments took their places alongside introspection in Wundt's laboratory.

The Ambiguity of Wundtian Psychology

Symbolically and substantively, Fechner's law remained essential to experimentalism. It provided the scientific momentum that helped propel the developing enterprise toward disciplinary autonomy. At the

same time, however, the methodological specialization that enabled psychophysicists to achieve a measure of independence separated Wundt's endeavor from the broader currents of psychological thought into which Wundt sought to place it. Wundt had tried in his way to use positivistic science to save idealism. It seems ironic, therefore, that a new breed of German psychologists after 1890 should castigate his distinctive approach while overlooking his traditional aims. According to Fritz Ringer, these innovators assumed that experimental psychology

was born in the shadow of the natural science. It was therefore infected with "naturalistic" errors from the very beginning. It took physiology as its model; it made the associationist scheme an epitome of all mental processes; it adopted the theory of parallelism. It tried to "dissolve" the notion of an integral soul, and it favored an atomistic and mechanistic analysis of consciousness in terms of primitive and logically isolated units of sensation. It was Lockean, simply-mindedly empirical, and positivistic.¹⁹

Wundt could not have accepted this assessment. Regarding psychology as the science of immediate experience (*Erfahrungswissenschaft*) and the method of psychology as introspection (*Selbstbeobachtung*), Wundt railed against physiological reductionism, calling it

materialistic pseudo-science, which sufficiently reveals its tendency to destroy psychology by claiming that the psychological interpretation of mental life has no relation to mental life itself as found in history and society.²⁰

Experimental psychology constituted only a part of what Wundt regarded as the "mental sciences" (*Geisteswissenschaften*), which included his "folk psychology" (*Völkerpsychologie*), a sort of historical anthropology of mental life.²¹ One must study human nature in the round in order to comprehend mind in its totality. While accentuating experimental psychology's technical distinctiveness, Wundt was unwilling to acknowledge its philosophic isolation. For all the talk about *physiologische* psychology, Wundt insisted that psychology was closer to philosophy than to the natural sciences. This stance was partly dictated by prudential considerations involving academic staffing, financing, and examining, as Ringer has duly noted.²² Nevertheless, Wundt's commitment to voluntarism deeply influenced his alliance with philosophy.²³ He wished to preserve a connection between experimentalism

and the broad tradition of empirical psychology that took mind as found outside the laboratory "in history and society"; in other words, in those contexts where the voluntaristic nature of mind was more readily manifest.

As a voluntarist, Wundt insisted, in what he called his theory of actuality, that mind is phenomenal, functional activity, not passive material. Since mind is active, consciousness is a mental process; mental life represents a "stream of consciousness" in ever changing flux. Here, however, theory seemed to contradict practice, for in the laboratory processes were necessarily reduced to static units.²⁴ Wundt's structural topography of mental elements appeared to many the antithesis of the dynamic analyses of active processes his psychological theory seemed to advocate. The trained introspectionist's exquisitely calibrated mental apparatus failed to resemble the ordinary mind found in history and society. Minute inspection of the connection between stimulus and sensation ignored many of the wider psychological interests in the relation of stimulus to the organism's responses, reactions, and adjustments. Furthermore, since infants, monkeys, and madmen could hardly be trained to introspect, Wundt's program provided little impetus to child, animal, and abnormal psychology, or to those interested in problems of education, biological adaptation, or in psychopathology and psychotherapeutics.

While Wundt continually revised his synthetic psychological theory to meet some of these objections, critical attention remained focused on that distinctive aspect of his system which changed less rapidly than the contextual theory surrounding it—the experimental program itself. Laboratory research remained "pure," introspective, predominantly associationist, sensationistic, atomistic, and structural. Rival formulations stressed the often practical, sometimes objective, anti-associationist, organic, dynamic, and functional nature of psychology. Stressing the novelty of their approaches, psychological reformers overlooked their intellectual debts and minimized the continuities between Wundt's approaches and their own by accentuating the positive features of the former. Why this happened in Germany is beyond the scope of this account. The phenomenon, however, was not confined to Germany. The American reformer James Mark Baldwin reminded his listeners at the St. Louis Exposition in 1904 that, although

the psychological laboratory was a German innovation, "it is not usually seen that this work does not involve a new point of view."²⁵ Hall regarded Wundt as "a grand importer of English ideas."²⁶ It remains a historical irony that Wundt is universally regarded as the founder of the new scientific psychology while his system is seen as a dying gasp of naive, sensationalist Enlightenment empiricism.

In the case of American psychology, this irony has bred a certain historical ambiguity in interpreting Wundt's importance. Accordingly, it might be useful to separate—at least for purposes of discussion—the intellectual and institutional aspects of Wundt's achievement and then to consider which aspects actually attracted students to Leipzig. Wundt had precociously provided a social organization for scientific pursuits: a laboratory, a journal, a research agenda, and an experimental ideology. One can evaluate Wundt's contribution to American psychology by examining which aspects of his scientific and philosophic reputation commended him to Americans, which aspects of his program proved most exportable, and how these imports fared in a new intellectual and cultural marketplace. Most important, one must understand how experimentalism competed with other priorities in the American colleges and universities, specifically in the departments of philosophy where it was initially housed.

CHAPTER 3

Sea Change

I would take all [Wundt's] lectures and work in his laboratory, as if for a degree, and say nothing of my purpose: to see if I could find in psychology either a basis for a science of ethics or a trail through psychology to some other science that might lead on to a scientific ethics. . . .

Ethics! There was no foundation in (experimental) psychology for a science of ethics; not that I could find. There might be some day, when psychology itself is scientific. All I got out of my year of German psychology was a lead into biology on the one hand and into sociology on the other, a curiosity to hear and see what the French thought they knew about such matters, and best of all, a training in the experimental method. . . . Lightly I say this now, but to me, in the spring of 1891, the conflict of ideas and emotions was a crisis that weighed heavily on me. I had lost time. I had lost myself.

—FROM *The Autobiography of Lincoln Steffens* (1931)

I recall very well that I had on one occasion been lecturing enthusiastically on Weber's Law to a class of New York City teachers. . . . when I was interrupted by one of my gray-haired auditors with this question: "Professor, will you tell us how we can use this principle to improve our teaching of children?" I remember that question better than I do my answer.

—Charles H. Judd, Ph. D.
(Leipzig, 1896)