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LIFE AND WORK

1.1 Ancestry and Early Years

GUSTAV THEODOR FECHNER was born on April 19, 1801 in Gross-Särchen, a village situated on the Neisse river in the southeastern region of Lower Lusatia.¹ His father, Samuel Traugott Fechner (1765–1806), had been a pastor there (probably Lutheran) since 1793, as his father before him had also been. Fechner's mother Dorothea Fechner (1774–1806), née Fischer, descended likewise from a regional pastoral family. From childhood on Fechner himself, the second of five children, was meant to join the clergy, too. His older brother Eduard Clemens (1799–1861) became an artist and moved to Paris in 1825, where he later died. The three younger siblings were Fechner's sisters Emilie, Clementine, and Mathilde.

Fechner's father has been described as a typical pastor of enlightened times: of a zealous nature, yet open-minded for progress. He was the first in his region to have a lightning rod mounted on the church; he upset the congregation by not wearing a wig during sermons; he had his children vaccinated, and he was a passionate fruit-grower. His young children were taught Latin—at the age of three, little Theo (Fechner's nickname) spoke Latin as fluently as he did German. Fechner's mother was affectionate, cheerful, friendly, and poetic, a woman who gathered a social circle around herself in all of life's situations.

Following their father's premature death in 1806, both sons were sent for a

few years to their maternal uncle, also a pastor, in Wurzen and Ranis in Thuringia. In 1814 Gustav Theodor was enrolled in secondary school in Sorau (now called Zary), a town near the village where he was born; later he spent two years at the School of the Cross in Dresden, where the Fechner children were reunited with their mother. He continued his education first by attending the medical academy for surgery for six months in Dresden and then—as a penniless sixteen-year-old student—registering to study medicine at the University of Leipzig. He maintained lifelong membership with his alma mater.²

In Leipzig Fechner also attended lectures on logic (held by the philosopher Wilhelm Traugott Krug [1770–1842]), botany, zoology, physics, chemistry, pharmacy, anatomy, physiology, obstetrics, and algebra. The eager student was not satisfied with the quality of teaching; he preferred learning from books. Yet, two particular lecture series caught his attention: “Having endured Kühn’s boring lessons, Weber’s lectures on physiology and Mollweide’s lectures encouraging me to study mathematics were the only two exceptions [to the otherwise tiring curricula] and provided me with ideas that promised to become extraordinarily fruitful. I even became Mollweide’s famulus for a few years. But despite all my effort, a lack of talent prevented me from being successful at mathematics.”³ (In due time we shall see that this self-assessment regarding mathematics is questionable.)

During Fechner’s early university years, Ernst Heinrich Weber (1795–1878) was just completing his habilitation work in Leipzig. Ernst Heinrich was the oldest of three brothers who all were to become well known scientists and remain Fechner’s lifelong friends.⁴ In 1818 Ernst Heinrich became a lecturer on anatomy and three years later a professor for anatomy and physiology in Leipzig. A prolific author, he gained renown for “The Sense of Touch and Common Feeling,” an article in Wagner’s *Pocket Dictionary for Physiology* (1846).⁵ This vade mecum entry examines “the slightest differences in weight discernable by touch, the lengths of lines discernable by sight, and sounds distinguished acoustically,” all features that subsequently were to become fundamental for Fechner’s law of psychophysics.⁶ “Weber’s Law”—as Fechner dubbed Weber’s scientific research results—states that the smallest discernable distinction between two weights, two lengths, or two sounds is expressible as an invariable ratio between those weights, etc., regardless of the sizes of the weights and lengths or the intensity of the sounds themselves. The difference between two stimuli is thus always perceived as having the same intensity, as long as the ratio holding between the stimuli remains unchanged.

A professor for mathematics at the University of Leipzig, Karl Brandan Mollweide (1774–1825), who also taught astronomy there, was equally interested in color perception. He gained renown for his critique of Goethe's color theory (1810). He was most likely the one to arouse the student's interest in subjective optical phenomena.⁷ Fechner became his assistant for a while.

As his studies progressed, Fechner realized that medicine had been an unfortunate choice. Training was so neglected that he had no opportunity to practice blood-letting (considered a common cure-all), let alone a chance to perform an operation of even the simplest kind. Fechner himself admitted that he lacked the hands-on talent required for becoming a physician. He finished his studies by taking the necessary exams, but he did not fulfill the requirements for acquiring a doctoral title. He received a bachelor in medicine, passed the practical physician's examination and received a master's degree paired with the license to teach at the faculty of medicine.⁸ While still a student, he subtly demonstrated a dislike for medicine by writing acerbic satires, published under the pseudonym "Dr. Mises" and titled *Proof that the Moon is Made of Iodine* (chiding the fashionable administration of iodide as a panacea) and *A Panegyric for Today's Medicine and Natural History*.⁹

This aversion to medicine, however, did not impair Fechner's fascination with natural science. On the contrary: He concluded that he was built for scientific theory, although he was not always pleased by this insight. The study of medicine also contributed to a loss of religious faith and to becoming atheist.

At the university, interest in science was only one of several factors shaping Fechner. Other impressions and influences, which at times conflicted with his scientific interests, were to become significant for his subsequent life and work. These crucial factors include:

- acquaintance with Oken's and Schelling's philosophies of nature,
- discovering Herbart's philosophical psychology,
- developing a romantic, aesthetic attitude toward nature and life, and
- being influenced by the philosophy of post-Hegel late idealism.

1.2 Oken's and Schelling's Philosophies of Nature

J. E. Kuntze's biography on Fechner includes two notes written by Fechner expressing his delight in Lorenz Oken's philosophy of nature:

In February 1820 I discovered Oken's philosophy of nature. I was so fascinated by the first chapter that although I did not thoroughly understand it and continued reading without real clarity, it busied my mind for years afterward.¹⁰

My studies in medicine had convinced me to become an atheist, estranged from religious notions; I now saw the world as a set of mechanical workings. Then I discovered Oken's philosophy of nature and began reading it together with my friend Spielberg, a student of theology. It suddenly shed new light on the whole world, including science, and I was dazzled. Naturally, I understood little of it—as one would expect—and I admit not getting much further than the first chapter. But in a nutshell, all at once I found a perspective for a comprehensive and unified worldview and set out to study Schelling, Steffens and other philosophers of nature. None of them provided much real clarity, but I felt that I myself might contribute to it. Some of the papers among my *Stapelia mixta* (1824) attest to that attitude.¹¹

It is important to keep in mind that—at least in hindsight—Fechner interpreted his conversion to philosophy of nature indirectly as alienation from inanimate mechanism and materialism and returning to religious notions, perhaps even as recapturing the religion of his youth on a higher level.

Before portraying how Fechner came to terms with the philosophy of nature, some general comments on the philosophical tradition in question are in order.¹² The beginning of all philosophy of nature throughout the early nineteenth century was Kant's *Critique of Pure Reason* (1781), which presented the forms of the world of appearances as functions of the human capacity for knowledge. Philosophy of nature aimed to subdue the dualism that results when appearances are separated from noumena; it intended to discover the connection between the world of noumena and human consciousness. Schelling said:

It is undesirable that nature converge *by happenstance* with the laws of our mind (as would be the case if it were mediated by a *third party*). We prefer that *nature herself* necessarily and originally not only *express* the mind, but also *realize it herself*; and that she can only be nature and be called nature by doing just this.

Nature is to be visible mind, the mind is to be invisible nature. *Here* then, in the absolute identity of the mind *within* us with nature *outside* of us, must lie the solution to the problem of how nature can be possible without us. The final goal of all our further research is therefore this notion of nature.

Nature's system is simultaneously the system of our mind.¹³

Philosophy of nature's task, then, is to portray nature's unfolding as the development of the mind: "All of nature, not merely a *portion* of it, is an ever-evolving product. Nature in its entirety is constantly being created and everything is involved in this process of creation."¹⁴

In its time, philosophy of nature appeared to be a serious scientific alternative to the widespread Newtonianism propagated by eighteenth-century French philosophers. That doctrine took the universe for a clockwork, ticking away mechanically. Life and consciousness are of minimal significance. In contrast, philosophy of nature exchanged “soulless mechanism” for an “animated organism,” trying to understand and explain the phenomena and the progress of life and consciousness within the context of the organic world.

An early, radical version of this kind of philosophy of nature was most consistently staked out and elaborated by Lorenz Oken (1779–1851). He lacked all restraint in exploiting the famous and infamous vernacular of the philosophy of nature. Although he had no real theory of organic evolution to offer, such as one that would allow for the transmutation of one species into another, he did take his theory of development one step further than most of his coevals and taught that higher order organisms spontaneously originated from organic “primeval slime.” Schelling, in contrast, denied all theory of organic evolution and Hegel thought of development as a conceptual change, but not as the metamorphism of nature.¹⁵

It helps to sketch the basic ideas of Oken’s theory. (Further evidence of Oken’s influence on Fechner is presented in 7.2). Oken’s *Textbook [Lehrbuch]*, that immensely impressed Fechner, begins as follows:

The philosophy of nature is the science of God’s own eternal transformation within the world.

It must show the stages of development of the world from its beginning in primeval nothingness; it must show how the heavenly bodies and elements originated, how these rose to a higher level and eventually became organic and developed into reason in mankind.¹⁶

This clearly characterizes the objective of philosophy of nature. Its purpose is to expound the development of the universe, starting with God’s original ideas and leading up to its highest form, the human being.

Oken’s philosophy of nature includes three parts: The Mathesis, a doctrine of the whole, deals with God and his activity. The Ontology is a doctrine of particulars, dealing with individual appearances in the world, or, the individualization of matter. The Pneumatology (later called Biology) is a doctrine of how the whole is also part of individuals. It deals with the continued effects of divine activity in individual things, in other words, with what is organic.

The whole has a real, material side (ether) and an ideal, immaterial side (God). The ideal side takes the form of pure oneness, the material side is diverse. The

idea and reality, however, are identical and differ merely in their form.¹⁷ Reality is created when God juxtaposes himself:

By postulating itself, the real, or diversity, or the world, comes into being. The creation of the world is nothing other than an act of self-consciousness, God himself appearing.

What we find as thoughts in our consciousness are the individual appearances of the world in God's consciousness. The things of the world are no more real for God than our thoughts are for our own minds. We carry a world within ourselves and create one each time we think or postulate ourselves; in the same way, God created by becoming self-conscious and he continues to create for eternity because he is continually becoming self-conscious; he is eternal self-consciousness, and nothing else.¹⁸

Oken makes use of the process of apprehending oneself (of becoming self-conscious) as a paradigm for all processes of nature. One could say that this turns a theory of self-consciousness into a theory regarding the whole world. Three "ideas": the postulator, that which is postulated, and self-consciousness become the source of all of the world's diversity. God's activity when he postulates himself is what Oken calls primeval activity, or the entelechy of God. One result of God postulating himself is the creation of polarity. And polarity is the cause of movement in the world:

All motion originates in duplicity, thus from the idea, and in a dynamic, not in a mechanic manner. The idea of a mechanical movement set off by other merely mechanical movements, or impulses, and continuing on through eternity is nonsense.

Nowhere do there exist purely mechanical movements, nothing in the world has become what it is through impulse; at the source of all motion is an inner act, an entelechy.¹⁹

"Polarity" became Oken's magic word for describing individual phenomena of the empirical world. Polarities occur in nature's universal substrate, namely ether. They set it in motion, allowing chemical elements to develop. New polarities arise and encourage the development of ores, salts, earth(s), and heavenly bodies, progressing further to galvanism, and further yet to the organic, plant, and animal kingdom. Extensive studies in embryology led Oken to a recapitulation theory stating that the development of the embryo repeats the pattern of developmental history of life on earth.²⁰ Further, his doctrine of "primeval slime" with its infusion-like "bubbles" representing the smallest units of life of which

organic life is comprised paved the way for the theory of protoplasm and for cell theory by Schwann and Schleiden.

Oken's system is an example of how idealism in the philosophy of nature turns into stalwart materialistic monism. The distinction between pantheism and pure materialism gets hazy. At bottom, Oken's philosophy of nature deals exclusively with matter. God is no longer the idea of the universe, but rather straightforwardly identical with matter, namely with ether: "Ether is the first instance of God becoming real and simultaneously his eternal position. God and ether are identical. Ether is the foundational matter of creation, everything arises from it, it is the ultimate divine element, the divine body, ousia, or substance."²¹ Reacting to this, Johann Eduard Erdmann notes in 1853 that "philosophy's tendency to become heathen"—latent in Kantianism and surfacing in the early works of Schelling—established itself permanently through Oken's work. He comments dryly: "For Oken the word 'God' merely means the universe and when he uses the word 'spirit' he does so using the widest possible meaning of the word so that if necessary, we could even subsume mint liqueur and such under it. Here a system of identity is transformed into simple philosophy of nature; what is ideal does not correlate to, but is merely a continuation of what is real."²²

This "heathen" aspect of the philosophy of nature had a profound effect on mid-nineteenth-century philosophical materialism, particularly influencing Moleschott, David Friedrich Strauss, and probably also Feuerbach and Engels. This fact is often overlooked. In 1856, for example, the philosopher Gotthilf Heinrich Schubert noted (in his memoirs): "Moleschott, Vogt, and others wholly endorsed the same thing openly stated or latently inherent in Oken's philosophy of nature."²³

The momentum that Darwinism gave German scholarly thinking in general cannot be understood without explaining Oken's impact. Darwin's theory was welcomed as unexpected empirical evidence and a logical furtherance of the notion of progress given by philosophy of nature, in all its materialistic varieties. Wilhelm Lütgert claims that German materialism did not stem from French materialism, but was instead an immediate and direct sequel to idealistic philosophy of nature, united by Oken.²⁴ Even Ernst Haeckel's theory of evolution—as Carl Guettler emphasizes—concurred with Oken's.²⁵

The coming chapters will show just how Oken's "heathendom" survived in Fechner's philosophy. In any case, Fechner was so impressed and captivated by the philosophy of nature that he believed he had finally found the right profession. He began preparing himself for a career in the philosophy of nature

and achieved a master's degree in 1823 (comparable to today's doctoral degree). Within a year he completed a habilitation thesis on *Praemissae ad theoriam organismi generalem*, was given permission to teach at the university (*venia legendi*), and planned to give lectures on "Schelling's and Oken's ideas in philosophy of nature."²⁶

His *Praemissae* deal abstractly with the nature of ideas, with qualitatively and quantitatively defining objects in the world, with the concepts of singleness and plurality, and with how units are made up of their members.²⁷ He tried to sketch a typology for the constitution of parts and how they must fit together if they are to make up a qualitative or quantitative unit. He hoped that these reflections would help him find general metaphysical categories relevant for all objects of nature and enable a general theory of organisms.

Guided by his insights in the philosophy of nature Fechner felt that he was on his way "towards discovering the secrets of the world and creation, and in tune with the philosophy of nature popular among scientists of the time, namely Schelling's and Oken's philosophies, [he could] lay a foundation for the entirety of human knowledge." But this conviction did not last for long. Soon after his habilitation he felt serious doubts about the Schelling-Oken philosophy. Working in philosophy of nature gradually turned into a nightmare and "a struggle I had always contained within myself that denied me satisfaction in my endeavors. I believed myself to be headed in the right direction, but never reached a sure goal. I racked my brains from dawn to dusk and sometimes on into the night searching for solid ground, but I was never happy with what I accomplished."²⁸ Eventually Fechner mentally overworked himself to the point of exhaustion. He was obsessed by the problems pursued in the philosophy of nature.

1.3 Turning to Physics and Overcoming Philosophy of Nature

Fechner's frustration led to such anguish that he finally ceased working in the philosophy of nature altogether. The decision to do so was particularly supported by hearing physiology lectures given by Ernst Heinrich Weber. Fechner claims to have learned the "correct conception of science" for the first time from those lectures. They aroused in him first doubts about philosophy of nature.²⁹ Also, his financial standing compelled Fechner to seek out a new area of work. To prevent drowning economically he dabbled in "literature."³⁰ With a style both lively and vividly terse he wrote two semi-popular science booklets; one was an outline for

logic as it was taught by Krug, the other a manual for physiology.³¹ He also flung himself with vigor into the translation of French science books, which he began editing and rewriting on his own. The most important of these are his translations of *Précis élémentaire de physique expérimentale* by Jean-Baptiste Biot (1774–1862)³² and *Traité de chimie élémentaire* by Louis-Jacques Thénard (1777–1857).³³ Fechner wrote additional volumes and extra chapters supplementing both works. Between 1822 and 1838 he produced between fifteen hundred and two thousand printed pages of text yearly as a source of income. After 1827 he added numerous scientific articles and books of his own.

Beginning in the winter of 1823–1824 Fechner held lectures in general and specific physiology for the faculty of medicine.³⁴ As an acknowledgment of his successful translation and congenial editing work on Biot, the second edition of which appeared as soon as 1828–1829, Fechner was awarded a temporary chair at the university of Leipzig following the death of the physicist Ludwig Wilhelm Gilbert (1769–1824) and continuing until it was taken over by Heinrich Wilhelm Brandes (1777–1834).³⁵ Originally there had been some intention to give him the chair permanently, but the idea was dismissed because Fechner was too young.³⁶ Translating Biot's work, however, helped Fechner because, as he wrote, it guided him “down a more exact path and I became aware that this was the only avenue to clear, certain and productive findings in science . . . I recall asking myself: could any of all those orderly and law-like arrangements of optical phenomena, that Biot expounds with such clarity, have been discovered with the Oken-Schelling approach? It is hardly a scientific method.”³⁷

Fechner applied himself zealously to his new task, experimenting thoroughly with what was known about electricity. After completing his stint for the chair position, he continued teaching unpaid lessons on electricity,³⁸ galvanism, electrical chemistry, magnetism, electro-magnetism, and very generally on “the latest progress in physics and chemistry.”³⁹ During the winter of 1831–1832 and the following summer term he also gave lectures on meteorology. Having just fled from the philosophy of nature, he hurled himself wholeheartedly at “Cauchy's most difficult doctrines,” prodded by the conviction that without mathematics nothing can be achieved in physics.⁴⁰

At the time, this attitude towards physics was certainly not common in German scholarly circles. A distinction was usually made between “natural history” (*Naturlehre*), in which mathematics played a subordinate part, and applied mathematics (mechanics, geometry, geometric optics, hydrodynamics, astronomy . . .). Not until the later half of the nineteenth century were methods introduced and

enhanced for using mathematics in physics⁴¹—mostly further developing the *Physique expérimentale* from the *École polytechnique* in Paris.

Thomas Kuhn has described this general process by which knowledge becomes more theoretical as a fusion between two separate scientific traditions, namely Baconian experimental science and classical mathematical science.⁴² The more axiomatic deductive sciences practiced since antiquity (astronomy, optics, mechanics) were augmented in the seventeenth century by experimental, math-free areas of research (magnetism, theories of heat and electricity, chemistry) resulting from an increased appreciation of knowledge gathered by craftsmen, pharmacists, and alchemists. The dawn of the nineteenth century in France then witnessed the mathematization of Baconian science, a development that did not occur in England and Germany until later.

Fechner's translating accomplishments and his editing of the newest French publications on physics and chemistry such as those of Biot and Thénard were, next to Gilbert's *Annalen der Physik* [Annals for Physics], the main source for disseminating French scientific knowledge; they contributed decisively to the commencement of similar theorizing in Germany, thereby reforming physics. The importance of Fechner's endeavors for establishing a scientific community in physics in Germany should not be underestimated.⁴³

Subsequently, Fechner's fresh interest in modern physics and chemistry effected his career choice. In 1827 he received a grant from the government of Saxony and visited Paris for three months, meeting Biot, Thénard, and Ampère.⁴⁴ In 1831 and 1832 he was a non-salaried university lecturer and finally in 1834 he became professor for physics, taking over the chair he had applied for following the death of physics professor and rector Heinrich Wilhelm Brandes.⁴⁵ In Winter 1834 he held his last lectures in experimental physics for the faculty of medicine.⁴⁶ In 1835 he executed his predecessor's plan and set up the first institute for physics in Germany in the newly built Augusteum.⁴⁷

Fechner's research in physics was chiefly on the theory of electricity, electromagnetism, and electrical chemistry. His studies in transition resistance became fundamental for later research on the polarization effects of electric current. He was among the first to recognize the importance of Ohm's law and tested it extensively in experiments, publishing the results in 1831 under the title "Quantitative Determinations of the Galvanic Chain" [*Maaßbestimmungen über die galvanische Kette*].⁴⁸ Fechner's work contrasts sharply with other research of his time, especially because he uses a strict quantifying method and because of the great amount of data which he produced in experiments and then discussed and evaluated.

In 1827 Ohm discovered the law later to be named after him. As trivial as it may seem to us today, at the time this law induced a profound change of meaning for the concept of electricity; it did not become common knowledge until the 1840s.⁴⁹ Fechner revised the third volume of the textbook on Biot in 1828, already basing it on Ohm's law. He said that for the first time this law "made sense of the causal relations in the galvanic chain."⁵⁰

At that time Fechner was not only active in physics research, but endeavored to keep abreast of advances made in chemistry as well. In 1830 he founded the journal *Pharmaceutisches Centralblatt* [Central Pharmaceutical News], which is still in publication today; he himself contributed articles to it throughout the first five years of its history.⁵¹ In 1832 he published a *Repertorium der Experimental-Physik* [Repertory of Experimental Physics] that surpassed the revision of Biot's textbook in acquainting German physicists with research done in France by Fresnel, Ampère, Poisson, Laplace, Navier, Cauchy, and others.⁵² We may say that this was the first journal for physics in Germany, a forerunner of the yearly journal *Fortschritte der Physik* [Progress in Physics], established in 1845 with Gustav Karsten as editor.⁵³

Besides these more experimental studies in physics, Fechner also fostered his inclination for general theoretical contexts. At a very early stage he expressed the opinion that material bodies are nothing other than "a system of atoms or molecules" and that "all material appearances . . . can be traced back to attraction, according to the law of gravity."⁵⁴ Here Fechner anticipated Helmholtz's notion that later was to become very influential, an attempt undertaken in *Erhaltung der Kraft* [Conservation of Force], published in 1847, in which he tried to show "that all effects in nature can be reduced to forces of attraction and repulsion, the intensity of which depends on the distance between the reciprocally effective points."⁵⁵

In order to demonstrate how physical phenomena could be reduced to reciprocal gravitational forces of atoms, Fechner devised a planetary model of atoms in which imponderables (electricity, heat), as small particles, orbit around a larger ponderable at the center. It was probably the first time in the history of physics that atoms were thought of in this way. (Chapter 4 discusses Fechner's atomism in more detail.)

Alongside of all this work, Fechner still found time to continue studying subjective optical phenomena, particularly contrasting colors.⁵⁶ In articles written in 1838 and 1840 he attempted to prove experimentally that the simultaneous contrast of collateral images depends on the subject; it is not part of the physical properties of light. He also found that the successive contrast accompanying

after-images is due to retina fatigue under prolonged stimulation, and not due to an inner development of light, as Joseph Plateau had taught. Both of Fechner's theories influenced future research. Helmholtz, when writing about contrasting colors in his book *Handbuch der Physiologischen Optik* [Handbook of Physiological Optics] published in 1867, relied greatly on Fechner's findings.⁵⁷

What became of Fechner's philosophy of nature after he turned to natural science and became an avant-garde physicist? No doubt, several motives rooted in his philosophy survived to be overtly and covertly incorporated into Fechner's later work, as we shall discover from case to case. What is important at this point is how Fechner himself saw his flight from philosophy of nature and his new attitude, and how both were evaluated by his coevals. In the work entitled *Tagesansicht* [Day View], published in 1879, Fechner once again remarked how as a student of medicine he had initially been fascinated by materialism, from which Schelling's philosophy distracted him for quite a while. He continued: "only to then be drawn all the deeper into it [into materialism]."⁵⁸ Fechner's "conversion" in 1820 was, then, contrary to claims frequently made in secondary literature, not enduring and ended quickly (at least according to his own *reflected* evaluation in retrospect). Deserting philosophy of nature was thus equivalent to returning to materialism. Proof that at the time Fechner's befriended peers shared his own judgement on this is given by a letter written by the painter Wilhelm von K ugelgen. He reports on a conversation between the two of them in July 1844 after playful boxing at the castle ruins of Falkenstein. His vivid and amusing portrait of Fechner reads: "Our talk was very interesting. He has a composed, sober mind . . . We didn't mention religious issues, but spoke instead exclusively about matters in philosophy of nature and I had to contend with his materialist bent. He seems to see all of life as merely mechanisms, therefore he sees not much difference between a locomotive and a lion or horse, except that the latter produce offspring. He is the first person of this sort that I have ever met and I cannot deny finding his toughness quite Saxon."⁵⁹ In 1849 he also wrote that Fechner's sentiments "tend mightily toward the coarsest sort of materialism."⁶⁰

In spite of returning to materialism, Fechner hardly considered his time spent pondering philosophy of nature to have been wasted. His benefit from that phase was that he learned to find and formulate comprehensive principles and general contexts in nature: "Yet what remained important to me from that period is the idea of uniformly culminating and mentally penetrating nature, an idea that I expressed in later writings, although the Schelling-Oken notion no longer held authority for me."⁶¹ In the following sections we shall see what Fechner particu-

larly meant by these vaguely formulated concepts of unity and where he thought a guarantee for the unity of nature can be found.

It is interesting to note once again that Fechner composed satirical and poetic texts, writing under the pseudonym Dr. Mises, as a means of easing the personal tension created by the relation of natural science to philosophy of nature, or that of materialism to religion. As early as 1821 in the aforementioned satire (*Proof that the Moon is Made of Iodine*) he pokes fun at Oken's *Textbook for Philosophy of Nature*; and in *A Comparative Anatomy of Angels* [*Vergleichenden Anatomie der Engel*]—a capriccio swinging between satire and seriousness—he cleverly imitates the thought patterns and persuasion habits of philosophers of nature. He later said that parts of this last treatise, which was once dubbed “the best scholarly satire” written in the German language,⁶² “playfully suggested” the idea that plants have souls.⁶³

1.4 Herbart's Psychology

While writing on Fechner's *Theory of Atoms* one of Herbart's devotees, Moritz W. Drobisch, noted in 1856 that he had first heard of Herbart from Fechner in 1824.⁶⁴ Obviously Fechner had early acquaintance with Herbart's theories. He never acknowledged Herbart's psychology and philosophy though; on the contrary, he exploited every opportunity to demonstrate how his own position deviated from Herbart's. Still we can assume that the conflict growing within him while reading Herbart's works encouraged him to articulate his own views. The difference between their views was not insurmountable, however. It did not prevent Fechner from adopting some of Herbart's particular concepts and approaches.

In his time, the philosopher Johann Friedrich Herbart (1776–1841) was considered the first scholar to not merely have spoken of the necessity of psychological laws, but to also have attempted to lay out and precisely define them.⁶⁵ He was also considered the one who deemed faculty psychology obsolete. Instead of tracing psychological phenomena back to any natural predispositions, to a “mere aggregate of the soul's faculties,” Herbart sought to describe a model of mental life in which various phenomena could be explained uniformly by “psychological laws linked by necessity.” His procedure for psychology must have effected his readership similarly to Descartes's rejecting *qualitates occultae* and replacing them with mechanic explanations in early modern physics.

Thus in *Psychology as a Science* Herbart sets out to “research the soul in the same way that we research nature; inasmuch as this implies presupposing an ubiquitous, completely regular relationship of phenomena, and investigating this by surveying facts, making careful deductions, by using novel, tested and corrected hypotheses, and finally, whenever possible, by contemplating values and calculation.”⁶⁶

The laws of psychology are to be found in the “facts of consciousness.” But since self-observation and observation by others always remain unsatisfactory, psychology must try to discover the connections of inner perceptions via something that is not directly given in perception. “Psychology on the whole can be nothing but an addendum to inwardly perceived facts.”⁶⁷

The most important annex that is not part of the facts—but that Herbart believed it was necessary to presuppose—is the existence of a substance (a substantial being) whose states we are aware of as the facts of consciousness. Here Herbart was guided by his desire to define the nature of ego or the self. Whenever I want to perceive myself, I am aware of myself as thinking, acting, being passive, or feeling. I am never aware of myself as merely “I,” but always only as something thought of. Since thoughts always require something that thinks them, there must be some immutable, simple and unified bearer of these attributes that are given to us as thoughts. Herbart calls this substantial bearer of mental phenomena the “soul” and defines it as a monad, or a “simple real being” (they have come to be called “reals”).

It has been proven in detail that observing one’s own self inevitably involves contradictions, inasmuch as we want to understand ourselves directly using the concept of ego, as if being an ego were the ground for our whole being. Being an ego must depend on something. And the carrier that supports it is, as always, a substance. We call it in particular a *soul*; because according to general principles of metaphysics, a substance is foremost incapable of modification in order to protect itself against being disturbed *by other beings* . . . and because in our case self-protection takes the form of *thought*, in such a constellation and context that it results in consciousness of the self, or being an ego.”⁶⁸

This amounts to a compact basic model of Herbart’s psychology. All mental phenomena—in fact, all appearances whatsoever—are the results of the modification of one being by another. Unlike his teacher Johann Gottlieb Fichte (1762–1814), who defined “self” as a self-positing activity, Herbart suspends the idea that consciousness autonomously posits thoughts. Thoughts, rather, are self-sustaining elements of the soul whose function is to prevent chaos: “Given

the impulse by the objects, and guided by them, we come back to ourselves, because *without* objects self-consciousness would be nonsense. It is not a matter of freedom at all.”⁶⁹ Since the soul is a simple entity, whatever disturbs it cannot merely coexist barring all connection. Opposing thoughts hinder one another, similar thoughts tend to coalesce. Each thought must have a certain intensity in order to survive in consciousness. An obstructed thought is obscure, an un hindered thought is lucid.

Each of us himself notices that at any given moment an incomparably smaller amount of knowledge, thoughts, and desires actually occupies our mind, than could be available if prompted. This absent, albeit not distant knowledge, this persistent knowledge that we have—in what state is it within us? . . . *Two* thoughts are sufficient to entirely expel a *third* from consciousness, and to produce an entirely different state of mind. . . . Just as we are accustomed to speaking of thoughts entering consciousness, I call the boundary that a thought seems to cross when it changes from being an entirely restrained state to the state of manifesting a degree of real thought: *the threshold of consciousness*.⁷⁰

Beginning with the simple mechanisms of obstructing and connecting thoughts, which is the soul’s tool for preserving its integrity, Herbart splits his investigations into two parts. The first is mathematical. Here he explains the laws governing the connection and repulsion of thoughts (he calls it the “statics and mechanics of the mind”) as a function of individual thought intensity and the degree to which thoughts differ. The second part is applied psychology. Here he explains various mental phenomena using the mathematical laws. While psychology presupposes the monadic soul, the soul cannot be its own object of study, because its true essence remains forever hidden. Granted, Herbart’s mathematical excursus is difficult to follow: In order to determine the equilibrium or movement of thoughts, he calculates the sum of obstacles. Nonetheless, his explanations are replete with interesting studies, for example on the development of self-consciousness in children. A child observes how a dog evades being hit with a stick and thus learns that the animal understands some idea of pain and sticks. “The child now forms a thought; this is important . . . progress and indispensable preparation for developing self-consciousness.”⁷¹ The concept of the self or “I” is evoked by the conflation of two sets of ideas.⁷² Notions of space also result from the conflux of ideas.

Fechner’s main objection to Herbart’s philosophy is one of method. Like every other science, psychology must set out using what is given, making no metaphysical assumptions. What is given must be acknowledged as real and not

considered a mere appearance relying on something that exists independently; something that alone is real, beyond what is given. If it makes any sense at all to ask what exists non-relatively, the question must apply to all of reality; what is given is not relative to individual, non-given substances, but to the enduring greater entirety of all reality. Speaking to a follower of Herbart, Fechner said, “To me the final or absolute reason for everything is not an X to be found beyond what is given, as are your simple qualities, but rather it is the whole, it includes everything given anywhere and anytime, and the laws and relationships that can be found to apply.”⁷³

If one is inclined to barge into metaphysics, one must first use “unpretentious empiricism” and once science has matured, one may then engage in conjecture about what is absolute, or about the entirety of reality, which is compatible with the given. But by beginning with metaphysics, as Herbart does, we “estrangle science from life.”⁷⁴

Fechner’s second objection follows from that. Herbart’s notion of being, or substance, is a general metaphysical concept lacking validity for science, unless it applies to everything. Science gets along fine without any notion of substance.” Since we are comfortable with what is relative, the concept of being also serves as a relative concept.”⁷⁵

Fechner derives his third strategy for criticizing Herbart from his training in physics. He confronts Herbart’s use of concepts with comparable concepts in physics, while simultaneously reflecting on how to realize Herbart’s hypotheses in terms of physics. The mental events that Herbart contrived must also always be physically realized. This insight changed Fechner’s appreciation for mathematical psychology. To measure means to use a materially given standard. Herbart’s psychology is unsuccessful because it lacks this connection to the physical world. New mathematical psychology must first produce a spatio-temporally valid standard. In *Zend-Avesta* he writes: “For reasons too lengthy to discuss here, Herbart’s principles of mathematical psychology are wrong. If mathematical psychology is possible at all—and I believe it is—it must be founded on measuring and calculating the material phenomena to which mental phenomena are attached, because these allow precise measurement.”⁷⁶

Although Fechner found Herbart’s mathematical psychology erroneous, he retained the latter’s notion of dealing with the mental mathematically. His criticism on Herbart’s theory did not prevent him from adopting two extremely important concepts for psychophysics, the concept of threshold and the notion of psychical intensity.

Herbart remained a role model for Fechner and his psychology counted many followers until at least the 1870s. Fechner often encountered Herbart's theory because Leipzig was the center of the Herbart School. The scholars there included professor Moritz Wilhelm Drobisch (1802–1896), the editor of Herbart's works Gustav Hartenstein (1808–1890), and Ludwig Strümpell (1812–1899).⁷⁷ Many scientists, for whom the years between 1820–1850 were formative, had come to terms with Herbart's theory in one way or another. These included, for example, Johannes Müller and even Helmholtz. For philosophy and psychology it is important to note that while Hermann Cohen and Wilhelm Wundt later became his heftiest critics, they originally worked on theories from Herbart.

Herbart's approach was obsolete by 1879, at the latest. His contemporary Benno Erdmann characterized Herbart's psychology as "transitory to contemporary precise psychology." Herbart, the Fichte-Ulrici group and some other congenial scholars continued to ground their sort of psychology metaphysically, preferring "exclusively methods of introspection." In contrast, new or experimental psychology is depicted as liberating psychological issues from the reign of metaphysics. Psychologists from the Herbart School, however, had the advantage over Fichte and Ulrici that at least "precise psychology . . . profited from their work."⁷⁸ Nowadays Herbart's psychology in the narrower sense is all but forgotten. But his pedagogical theories are still quite popular and these, in turn, include several elements of his psychological theory.⁷⁹

1.5 The Aesthetic and Romantic View of Nature

Besides being engrossed in the philosophy of nature and the analysis of Herbart's theories, another epochal factor shaping Fechner's life and work was the instillation of a general life attitude permeated by an aesthetic and romantic view of nature. This gradual change was inspired by Martin Gottlieb Schulze, a friend two years his senior. Fechner wrote that the "acquaintance and long close association with a kind of depraved genius throughout the 1820s" was one of the events that "altered my mental life" and "remained a sustained influence."⁸⁰

Around 1823 Fechner was introduced to Schulze by Christian Hermann Weisse (whom we shall meet again later). Schulze, too, was the son of a pastor and a student of medicine who had interrupted his studies after his theoretical examination and led the life of a restless Bohemian and penniless author, full of ambitious plans that failed to reach fruition. He abhorred what he called sterile science

and tradition; he reveled in nature and poetry and had a fascinating, demonic allure for the young people around him, including Fechner. It was perhaps in an attempt to disengage Fechner from Schulze that Fechner's mother moved from Dresden to Leipzig in 1824, taking charge of her son's household. Fechner had more or less regular contact with Schulze until at least 1846. Schulze himself eventually ended up in a lunatic asylum.⁸¹

Inspired by Schulze, Fechner absorbed the underlying impulse of the romantic worldview, which Wetzel has aptly described as desiring "the union of man and nature, the equality of knowledge and imagination, science and poetry, critical and ironical reflection and intuitive immediacy of feeling."⁸² According to this romantic attitude, nature is whole. Any adequate description of nature, therefore, must also encompass the emotional, aesthetic, and ethical meaning that it has for us and consider these elements just as important as theoretical content. Man himself and all that defines man is part of nature; to find his way, man must be aware of his far-reaching and full roots in nature. Humanities and natural science are one—or at least they meet at an ideal vanishing point.

An early expression of this view of nature can be found in Johann Wolfgang Goethe's famous reaction to Baron Paul Thiry d'Holbach's *Système de la nature* published in 1770, which at that time was considered a paradigm for materialism and determinism in both moral and cosmological terms. Goethe did not worry that Holbach's theory is wrong or absurd, but that it is "gray," "dark," "lifeless," "quintessentially senile," "unpalatable, indeed tasteless."

Goethe writes, "How hollow and empty we felt in this tristful atheistic twilight, where earth and all its creatures and heaven with all its stars disappeared."⁸³ For Goethe a system like that could never do justice to the vital, vivid character of life and the splendor of the "great embellished world" and therefore is not to be taken seriously.

Even Alexander von Humboldt's writings contain a trace of this attitude toward nature, combined with a religious twist. For Humboldt, both natural science and poetry on nature intend to portray the world as a whole: "Nature is the living expression of God's omnipresence in the works of the sensual world."⁸⁴ Clearly, art is much better equipped to portray nature than is science. A serious believer in the aesthetic-romantic attitude would feel compelled to become an artist or poet, rather than a scientist.

Evidence that Fechner saw himself in this predicament is expressed in a letter he sent as a young man to the poet Jean Paul, whom he revered, accompanied by a packet of his attempts at literature (probably the *Stapelia mixta*, appearing

in 1824). Therein he described himself as someone who “at heart perhaps sometimes does not truly know what he wants.” He continues: “except that, as I am aware, in all individual things I constantly search for the whole or would like to make them into a whole, but unfortunately I lack the inner talents for *art*, although I would prefer it to *science*.”⁸⁵ It is plausible that Fechner’s romantic worldview was heavily guided by the works of Jean Paul.

As important and radical as this romantic-aesthetic dimension had become for Fechner’s life (at least as an ideal worth pursuing), it eventually dulled his sense of needing to make a choice between “an aesthetic literary life and exact scientific research.”⁸⁶ The identity that he had just struggled to build as that of a modern, mathematically-schooled natural scientist was dealt its first blows and threatened to fall apart as quickly as it had been erected: “The effect of his [Schulze’s] influence on me during years of friendship was that he entirely estranged me from my inclination for science, the only thing I was really good at, and turned my occupation with it into a burden for me, although I was bound to it. His fundamental views, having nothing to do with the real necessities of life, never impressed me as being true or useful, but they kept me in inner discord, and I had to gradually rediscover a taste for the work I was obligated to do.”⁸⁷

So Fechner saw himself unable to live up to his own aesthetic-romantic disposition. He lacked talent for the life of an artist or a poet and ultimately found his friend’s notions inappropriately unrealistic. What endured were Fechner’s satirical and humorous writings, a volume of *Poems* published in 1841 and a *Riddle Booklet* published 1850 that was reprinted four times within his lifetime. He fostered a lifelong interest in pictorial art and made minor contributions to art critique. In 1839 he published a lengthier essay on contemporary art, which drew attention in Leipzig, and the last piece to be published before his death is on the architecture of the Mende Fountain in Leipzig, erected anterior to the Gewandhaus.⁸⁸

Taken altogether, all these formative factors seem to indicate that throughout the 1820s–1830s Fechner experienced an ambivalent period full of conflict: The materialism of medical training, promoting a relentlessly keen observation of nature; the metaphysics and (half-heathen) religion of philosophy of nature, envisioning the unity of thought; a romantic-aesthetic attitude, intuiting the holism of life; modern physics, providing supreme clarity, methodical certainty and a realistic perspective for the future—all of these factors attracted him with equal persuasion, but could hardly be combined without contradiction.⁸⁹

1.6 The Philosophy of Late Idealism

The German philosophical movement that, over a period of years, accompanied Fechner's release from the aforementioned conflict with its lingering indecision and shaped his solution to that struggle was late idealism.⁹⁰ It offered Fechner tangible suggestions for a practicable solution and united the seemingly incompatible.

Once again, the influence arose in a personal constellation. Fechner's closest friend,⁹¹ his peer Christian Herman Weisse (1801–1866), was one of the major advocates of this sort of philosophy.⁹² The two had been friends since the early 1820s. "The personal friendship of the two scholars," wrote Kuntze, "suffered not the slightest interruption until Weisse's death."⁹³ The latter became a lecturer at the university in Leipzig in 1828 and a professor for philosophy there in 1845. He endorsed a sort of speculative theism, adopting elements of Hegel's philosophy, while simultaneously vehemently rejecting other parts of it, thereby achieving its own originality.

The second important representative of late idealism was Immanuel Hermann Fichte (1797–1879), son of the philosopher Johann Gottlieb Fichte and professor of philosophy at Bonn and Tübingen. Both Fichte and Weisse had been influenced by Schelling's late philosophy but found affirmation for the route they had taken independently of Schelling.⁹⁴ Although late idealism made no huge waves, during the 1840s–1850s it was a considerable factor in the appointment of chairs in philosophy at German universities. Ludwig Noack writes that at the time "hardly a young philosopher had a chance to get a position at a university, if Fichte's son or Weisse's grandson had not certified that the applicant's way of philosophizing was Christian."⁹⁵

Generally, late idealism can be characterized as a critical and yet reconstructive position vis-a-vis the early idealism of Hegel, Fichte, and Schelling. On the one hand it criticizes German idealism's "pan-logicism,"⁹⁶ which constantly treats formal definitions of thought as something real and claims that the evolution of philosophical thought is the primary process of the real development of the world itself. Now according to Weisse and Fichte concrete reality cannot be reduced to what is conceptually comprehensible. Logic and ontology are justified by the fact that they deal with the *possibility* of being and the definition of thought. But they do not come near to *reality* in its tangible individuality. In this sense late idealism collaborated with "the nineteenth century's revolution

in thought” (Löwith) and on this point was of one opinion with Kierkegaard and Feuerbach’s critique of Hegel and the many types of materialism that originated therein.⁹⁷

On the other hand late idealism strives to preserve what it considers the accomplishment and intention of German idealism by eliminating the shortcomings it saw in its early phase. Within the highly diverse spectrum of post-Hegel criticism of idealism, late idealism attained its specific identity through 1) the challenge of freedom and personality that arose out of the critique and 2) the method, disdainful of abstract categories, that was applied to solve the problems.

Weisse and I. H. Fichte considered the fundamental challenge of post-Hegel philosophy to be how to defend, redefine, and understand the real and finite in comparison to what is merely an idea, and individual freedom as opposed to what is general and absolute. Whatever is tangibly individual is more than a mere abstract moment in the course of the world’s development, more than a mere “mask of a universal spirit,”⁹⁸ as Hegel had taught. In order to correct Hegel’s conceptual errors on these matters, it would take a new concept of personality, for both God and the finite individual.⁹⁹

So late idealists want to overcome Hegel’s pantheism by fusing it with speculative theism founded on a personal God. God, or The Absolute, is not to be thought of as an impersonal spirit, but as a personal and free, absolute “I.” This fusion is justified by an ontological proof of God’s existence conjoined with the cosmological. Within himself, God unites the idea of the Truth as the logical form of the conceivable process of the world with the idea of Beauty as the principle of vital individuation, meaning that it is the principle of all purposes that free individual persons autonomously devise in their pursuit of happiness. “The true concept of divine personhood results from what is particular penetrating what is spiritually absolutely universal.”¹⁰⁰

Since idealism as it was known had neglected the topics of freedom and what is special about individual reality, within his philosophy Weisse attributes fundamental significance to aesthetics, “the science of the idea of beauty.” Of all his writings, his coevals valued his *System of Aesthetics* published in 1830 the greatest.¹⁰¹

All that is real originates in acts of freedom, originates in “voluntary action in general,” either acts of God or acts of his creation. These acts are voluntary because they totally lack subjection to necessity. In creating the world, God willingly limits his own power and thereby continuously establishes the spontaneity

and freedom of the beings he created. Spontaneity and freedom of action occur within time and thus make God a historical being, unfolding himself over time. These two traits also restrict his capacity to entirely foresee the future.

In the process of reconstructing and reordering speculative thinking the need became obvious to insert several steps in order to mediate and make relative the transition from thinking to being, a transition that Hegel makes without much ado, and to rethink the conceivability of objective knowledge. Beginning around 1831, I. H. Fichte and Weisse call this endeavor “Theory of Knowledge” [*Erkenntnistheorie*]. It was intended to move forward in the direction Kant had indicated and investigate afresh the conceivability of speculative knowledge.¹⁰² In 1847 Weisse published an oratory discussing *How contemporary German philosophy should follow Kant’s lead*.

Weisse’s and Fichte’s efforts eventually bring forth a peculiar synthesis of speculative idealism and Christian theology, simultaneously emphasizing contingent, empirical experience in nature and history. In this spirit Fichte founded the journal *Zeitschrift für Philosophie und spekulative Theologie* [Journal for Philosophy and Speculative Theology] in 1837, which also served as an organ of opinion for Anti-Hegelians.¹⁰³ This publication was meant to promote speculation, while incorporating what is real in nature and history. It encouraged appreciation for empiristic thinking, which at the time had a poor reputation in academic philosophy.¹⁰⁴

The objective of philosophy was no longer viewed as merely understanding the universal form of the logical idea in terms of abstract and dialectical categories, but to describe “the idea’s unique way of being,” as it actually appears in the real, contingent world, and to further develop it into a philosophy of nature and anthropology. The periodical mentioned above (and renamed in 1847 *Zeitschrift für Philosophie und philosophische Kritik* [Journal for Philosophy and Philosophical Critique]) took this task so seriously that until it was discontinued in 1918 it was among the nineteenth century’s most important organs for what we today call “philosophy of science.” Alongside Fechner, Ernst Mach and Moritz Schlick also published here; even Hans Reichenbach’s dissertation was reprinted therein.¹⁰⁵

Weisse’s philosophy influenced not only Fechner, but also the physician and philosopher Rudolf Hermann Lotze (1817–1881), who likewise lived in Leipzig.¹⁰⁶ Until 1844, when Lotze became Herbart’s successor at the university in Göttingen, Weisse, Lotze, and Fechner comprised the heart of a “little circle” that met

once weekly.¹⁰⁷ Late idealism, however, effected Lotze differently than it did Fechner. The main difference relates to their views on the mental. While Lotze saw the unity of consciousness, similar to Herbart's psychology, as proof of a uniform substance of the soul, Fechner assumed a synechology, in which the mental is an emergent property of a system. Granted, both wanted to reconcile the concept of teleology with natural science's concept of causality. But to achieve this Lotze succumbed to the existing mechanistic worldview, while Fechner—without becoming unscientific—was able to productively reinterpret the prevalent philosophy of science. Over the years Lotze critically analyzed Fechner's writings repeatedly.¹⁰⁸

But let's get back to Fechner. How is his philosophy related to Weisse's philosophy? Basically both agree on what to demand of philosophy: namely, that it rekindle inquiry into how being and thinking are related and employ new methods in searching for ways and restrictions for a solution—methods resulting from logical, empirical thought.

As much as they may have agreed on objectives, their way of thinking was hardly similar: In spite of all his criticism on Hegel's philosophy, Weisse did conform to the speculative, Hegelian way of thinking, while Fechner vehemently rejects even the smallest residue of speculative method and favors solely those methods allowed in natural science. Kuntze writes: "It is true that on the question of *what* we know, i. e. what the thinking mind should learn, their opinions [Fechner and Weisse's] did not diverge, for Fechner also sought (not merely what is particular, but also) what is universal and whole—what is universal in the world, the world's wholeness, but on the philosopher's second question of *how* we recognize the universal and the whole and try to conceptually grasp the universe, they had basically and characteristically different views."¹⁰⁹

Nonetheless, an entry in Fechner's diary testifies to their deep friendship, despite all their differences: "Although I share none of his [Weisse's] opinions on science and art, he is my most valuable friend here and with him I enjoy the most intellectual discussions."¹¹⁰

The exchange between Fechner and Weisse must have been marked mainly by debate over the aforementioned issue of the acceptable means for establishing knowledge. Kuntze reports that their conversations were vigorous: "Whenever they met, their minds collided and explosions took place . . . It was a contest, where no one was spared, arms clashed intensely, and a knight had to sit firm in his saddle or else roll in the dust."¹¹¹ These debates apparently re-

flected the whole range of conflict between German idealism and modern natural science. Yet the rigorous arguments seem not to have harmed, but to have invigorated their friendship.

Of all the philosophical ideas that Fechner, in spite of his wariness, adopted from Weisse (or conceived jointly with him), the most important was the idea of spontaneity in nature. Fechner's ideas on non-determinism, his view of the role of mathematics in science, and his theoretical statistics depend directly on the particular philosophy of freedom and individuality cultivated in late idealism. We shall return to this context in detail in chapter 8.

All of his life, Fechner was critical of academic philosophy. He often made sarcastic and ironic remarks about Schelling, Herbart, and Hegel, particularly regarding how they constructed concepts a priori and their rationales. Hegel's philosophy, he wrote, is "in a certain sense the art of how to unlearn correct inference."¹¹²

THIS look at late idealism completes our overview of the most significant factors at work in shaping Fechner's scientific personality. Reviewing all the influences, we notice that on the one hand Fechner's development is typical for many physicists and natural scientists of his day. Like so many scientists, he was born into a protestant pastor's family, he matured early, was intelligent, and educated himself more through his own studies and experiments than in lectures at the university. Like many others of his generation, he was more receptive for physics as they were taught in France than for the ideals of domestic "*Naturlehre*" (natural history). Quite typically, he observed the necessity for enhancing the role of mathematics in science and demanded it, although his own insufficient knowledge of mathematics made it difficult for him to fulfill that ideal. With other men of his times, such as Johannes Müller, Justus Liebig, Hermann Helmholtz and Matthias Schleiden, he shared an interest in combining physics with state of the art philosophy and toyed with philosophy of nature.

On the other hand Fechner differs uniquely from his contemporaries in science: First, he has a literary and artistic bent, unusually strong religious struggles and an immense passion for work. And while others gradually settled for either philosophy or science, religion or materialism, a literary existence or the life of a professor, and romanticism or realism, Fechner remained undecided for a long time, seeking general ways of thinking that would enable all these contradictory facets to be united. After eventually deciding upon a career as a physicist, he wasn't really content with that choice. His illness, which shall be discussed in

section 1.8, quasi-enabled him to be an outsider who combined contradictory realms in concepts. While it is true that indecision and inner strife generally are characteristic of the German literary epoch called Biedermeier, it was not representative of scientists of that time. Fechner also embodies independent and courageous thinking, remaining uncompromising, even if it cost him his career or fame. Wilhelm Wundt's opinion is typical and touches upon a theme varied by many who knew Fechner personally: "I know no other general expression for this trait than to say that he *absolutely lacks intellectual prejudice and is fearless in his own convictions*. I cannot recall ever having observed this quality developed to a similar degree in any other person, a character for which I count it one of the most unforgettable rewards of my life to have met him."¹¹³

1.7 Beginning Philosophical Work

We interrupted the story of outer circumstances in Fechner's life just when he had been granted a professorship for physics. In 1833 he married Clara Volkmann (1809–1900), whom he had met through her brother Alfred Wilhelm Volkmann (1801–1877), one of his university friends who later became a physiologist and anatomist. Clara Volkmann came from a respected bourgeois family. Her father Johannes Wilhelm Volkmann (1772–1856) was the City of Leipzig's senator for architecture.¹¹⁴ Fechner and Clara's marriage has been described as happy; they remained childless.

Prior to inauguration as professor, Fechner had taken on the job of editing a *Home Encyclopedia* (a guide for organizing the household) totaling eight volumes published between 1830–1834 by Breitkopf and Härtel containing eight hundred to nine hundred pages per volume.¹¹⁵ This task cost Fechner so much time and effort that for a while he felt unable to accept the chair in physics. The university and the government agreed to allow him to postpone taking office until December 1835.¹¹⁶ He wrote nearly a third of the encyclopedia contents himself, including such prosaic entries as "Carving Meat and Setting the Table."¹¹⁷

Fechner embarked upon this project as a means of achieving financial success and independence, at least temporarily. The idea was realistic, since all sorts of conversational dictionaries established at that time by Brockhaus, Meyer, and Pierer sold with enormous success. And Fechner's encyclopedia does seem to have been profitable to a certain extent. It was printed twice without any changes.

But the third edition, revised by one Dr. Hirzel, failed utterly and brought a huge loss for the publishing house Breitkopf and Härtel, which belonged to a friend, the lawyer and art patron Dr. Hermann Härtel (1803–1875).¹¹⁸

Besides working on the encyclopedia, Fechner also had work to complete for the yearly volumes of the pharmaceutical news mentioned above, another of the obligations he had entered before attaining professorship. In spite of this burden, he found time for thorough experimental investigations into the theory of electricity and physiological optics. His experiments in the theory of electricity dealt mainly with the ongoing debate over whether the process of generating galvanic current should be explained physically in terms of contact or by chemistry.¹¹⁹ As for publications, Fechner was one of the most prolific German physicists of his time.¹²⁰

In 1835 Fechner wrote a book differing from all his other writings and which in many respects lay the seed for his later philosophical development. He published it as the *Little Book on Life after Death*, using the name Dr. Mises, a pseudonym he had previously used for satires.¹²¹ At that time the topic of immortality was of general interest, a subject of heated debate.¹²² Philosophers educated in Hegel's philosophy were the main participants in these debates; among them the late idealists. As they had taught that man and that being in general is unique and individual, it was up to them to also inquire whether individuality is limited temporally or whether the self is enduring and indestructible. If it were transitory, this would mean that in the end Hegel is right and history is nothing but the brain child of an impersonal absolute spirit, indifferent to the individual and personal freedom.

Thus the late idealists were called upon to explain how the individual's continued existence after death could be deduced from the notion of the absolute as a person. In 1834 I. H. Fichte wrote on *The Idea of the Person and Individual Duration* (second edition appearing in 1855), followed by *Continuance of the Soul and Man's Place in the World* in 1867. Weisse also wrote *The Secret Philosophical Doctrine of the Human Individual's Immortality*, published in 1834. But not only Hegelians and former Hegelians wrote on the topic. Bernard Bolzano (1782–1848), for example, had written as early as 1827 *Athanasia, or Reasons for Immortality*, in which he carefully critically analyzed various attempts of his contemporaries to deal with the notion of immortality.

Fechner's treatment of this theme can be viewed as an effort to show that the late idealist notion of personal continuation is compatible with a naturalistic concept of man. As he relates in the preface, Fechner got the main idea for the

little book during a discussion with a theologian named Billroth, one of Weisse's followers. Billroth thought that spirits of the deceased continue to exist in the living.

According to Fechner, humans pass through three phases of life: a prenatal phase, life on earth, and life hereafter. During the transition from the second to the third phase humans are destroyed physically, but consequences of one's previous expressions of life continue to exist. "Each cause retains its consequences as an eternal possession."¹²³ So whichever material system comprises all the causal effects of prior conditions, that material system also carries on the individual spiritual property belonging to a person during his life on earth: "Whatever permits the body of an old man to continue the same consciousness that was in his body as a child, of which he has not one atom anymore, will also let the body in the hereafter continue the consciousness of the old man, of which he has not one additional atom." Here Fechner views the property of having consciousness as a functional property of systems. One and the same consciousness can be realized by entirely different systems. In death man awakes in a "self-made organism, a unity of innumerable mental creations, effects, and moments; it can be larger or smaller and more or less have the strength to continue developing, depending on the extent and degree with which the mind of the person grasped his world during his life."¹²⁴ This new "organism" no longer requires sense organs for receiving information from the outside world. External light and sound waves that the organism previously used to determine the nature of its surroundings now themselves make up a part of his new organism, insofar as they are connected to traces that the physical organism left behind during his life. The deceased, therefore, has the same relationship to the processes of nature that the living person had to the functions of his body.

The organism that supports consciousness after death is connected in various ways to the organisms of the living and the deceased. The new physical bearers of consciousness are so interwoven that it is no longer possible to identify the particular carrier of one individual consciousness. One and the same physical system can support several consciousnesses (or at least parts of them). Casting several stones into a pond simultaneously, after a while we can no longer tell which stones caused which ripples, although the distinction undoubtedly could be made.

Yet even a living body supports consciousness that is influenced by other consciousness. Our mental life consist of more than what it itself creates, it includes the effects of other consciousness, as can be observed most clearly when

in abnormal states (such as somnambulism or mental illness) the real reciprocal relation of interdependence between those states is disturbed in favor of another consciousness.

The inner schism so often found in a person is nothing but the struggle of foreign minds seeking to conquer that person's will, reason, or concisely, his entire internal nature, for themselves. Just as a person perceives the agreement of other minds within him as peace, clarity, harmony and security, he perceives their struggle as discord, doubt, faltering, confusion and dissension within himself. . . . A person's self therefore remains out of danger amidst all this struggle, as long as he preserves his innate freedom and strength and never tires of exercising them.¹²⁵

This resembles Sigmund Freud's constellation of the ego, superego, and id.

Fechner's notion of survival after death is entirely compatible with the materialism he endorsed at the time. He mentions no tenet for the ontological status of consciousness or its relationship to the body. He simply commences from the fact that consciousness exists in the world and that our experience associates it with certain physical systems, namely (living) bodies. It is important to realize that when Fechner uses the term "hereafter" he is not speaking of a transcendental, empirically inaccessible realm, but instead, he means that part of *this* world that functions as a new bearer of the former consciousness.

This reflects the immense justice of creation, namely, that each person himself creates the conditions for his future being. One's actions are not requited by reward or punishment; there is neither heaven nor hell in the normal Christian, Jewish, and Heathen sense of the word, where a soul goes after death; the soul neither ascends nor descends, nor does it remain idle; it neither bursts nor does it flow into the universal; instead, after surviving the transitional illness called death, it continues to grow calmly according to the permanent logical consistency of nature on earth that erects each phase on the foundation of an earlier phase, and leads to a higher form of being.¹²⁶

In this booklet Fechner anticipates a number of ideas that come to fruition in his later writings and which enable him to eventually advocate animation of the whole universe. It is interesting to note that two years after Fechner published this piece, Weisse, using the pseudonym Nicodemus, also wrote a "booklet"—partly to refute and partly to amend Fechner's booklet—calling it the *Little Book on Resurrection*. He opined therein that life after death is to be understood as purely mental. The only souls granted life after death are those possessing original minds. Mindless persons "melt into nothing and burst like empty bubbles."¹²⁷

Today, Fechner's ideas may seem foreign to us. One reason is that contem-

porary philosophy shuns the question of life after death. Nevertheless, Gebhard is wrong in claiming that Fechner's *Little Book* preludes "the development of irrationalism in Fechner's works," pursuing a "glorification of death."¹²⁸ For Fechner "the world beyond" is precisely *not* a region remote from the earthly sphere, but instead, it is the realm that each person creates for himself during his life on earth. Fechner should be read conversely as *criticizing* the exaggerated unrealistic fantasies about life after death so typical of the epoch: If we must have life after death, says Fechner, then please provide a naturalistic explanation for it. And with his booklet Fechner intended just that. In doing so he came much closer to Feuerbach and David Friedrich Strauss than one might initially imagine; both of whom denied immortality, but thought that a person survives through his or her works.

Fechner's view is no more speculative than science fiction fantasies like those devised in artificial intelligence by Hans Moravec and Marvin Minsky. His ideas can be easily translated into contemporary computer jargon: Death represents a point in time at which the program executed by one's mind is taken over by other hardware: namely by the causal chains which we have started through our actions during our lives. Moravec thinks it possible that in the near future we will be able to program a computer with our mind (from our brain) in the course of our biological life. "When you die, this program will be installed in a mechanical body, which then without interruption easily takes over the responsibility for your life."¹²⁹

1.8 Illness

Gradually Fechner's load of obligations and emotional struggles ruined his health. It exhausted him to continue lecturing in physics; he had felt not up to it from the start. Above all, he believed that a "lack of talent in mathematics and practical things" disqualified him for professorship in physics.¹³⁰ He soon suffered headaches and insomnia, a lack of motivation and long stretches of ennui. Lack of concentration and disruption entailed by these symptoms made working a nightmare; even two medical treatments in curative bath sanatoriums brought no relief.

After Christmas of 1839 this torment grew into an acute and severe crisis, forcing him to discontinue lecturing.¹³¹ Using himself as a test person in numerous experiments while investigating after-images and contrast phenomena,

experiments in which, for example, he looked at the sun through colored glass, Fechner induced massive eye trouble, including constant flickering. The after-images of his observations persisted unusually long: “Through a two-hour long observation of five to five minutes the image of the scale viewed through a telescope imprinted itself onto my eye so strongly that even twenty-four hours later I still saw the same image every time I closed my eyes or directed my glance to a dark or merely dusky place.”¹³² His hearing also suffered. Eventually Fechner became so sensitive to light that he blindfolded himself and diagnosed himself as blind. He tried all kinds of harmless and harmful treatments. In 1841 he lost all appetite and emaciated himself to the point that he could no longer stand upright.

In Leipzig the scholar’s condition became the talk of the town. One day a woman he did not know sent him a meal, about which she had dreamt that it would deliver him from his ordeal.¹³³ The recipe actually helped Fechner to slowly take in food once more.

In addition to the anguish of starvation and blindness, Fechner was afflicted throughout the following year by worry about a mental disturbance, namely, the “total destruction” of his “mental energy”—as he put it. A severe loss of thought caused him to break off all social contact. His main activity consisted in trying to control his thoughts. The scenario he had depicted in the *Little Book* now happened to his own mind. It became the arena for a struggle among foreign influences, threatening his autonomy:

My inner self split up as it were into two parts, my self and my thoughts. Both fought with each other; my thoughts sought to conquer my self and go an independent way, destroying my self’s freedom and wellbeing, and my self used all the power at its will trying to command my thoughts, and as soon as a thought attempted to settle and develop, my self tried to exile it and drag in another remote thought. Thus I was mentally occupied, not with thinking, but with banishing and bridling thoughts. I sometimes felt like a rider on a wild horse that has taken off with him, trying to tame it, or like a prince who has lost the support of his people and who tries slowly to gather strength and aid in order to regain his kingdom.¹³⁴

For a while he tried to alleviate his agony by inventing riddles or somehow keeping himself busy. Using auto-suggestive techniques he was gradually able to readjust himself to light.

Meanwhile, everyone assumed that Fechner would no longer fulfill his duties for a long time.¹³⁵ In 1840 his public lectures were taken over by the older son of his precursor in office, professor for mathematics and physics at the Nikolai

School, K. W. Brandes. After much consideration, finally Wilhelm Weber (1804–1891), who, as one of the Göttinger Seven had lost his professorship, was nominated to take up Fechner's chair.¹³⁶ Weber sent a statement to the government that he would reinstate Fechner as director at the institute for physics, if he should convalesce.¹³⁷ In that case Weber would be made the director of a new laboratory and observatory for magnetism.

Following several swings and a peak in August 1843, Fechner's illness abruptly changed for the better in October of the same year, accompanied by a manic phase and megalomania:

The quick and favorable transformation that happened in the course of my psychical and physical life, and the way it happened, pushed me in October and part of November into a strange, crazy state of mind that I was unable to describe, particularly since once it was over, a clear memory of it all but vanished. I am certain that I believed that God himself called me to do extraordinary things and that my suffering had prepared me for it, that I felt that I in part possessed extraordinary psychic and physical powers, and in part was on my way to achieving them, that the whole world now appeared to me in another light, than it had before and does now; the riddles of the world seemed to reveal themselves; my earlier life had been extinguished and the present crisis seemed to be a new birth. Obviously my state was close to that of mental disorder; nevertheless, gradually everything settled into symmetry.¹³⁸

One of his sisters describes Fechner as being “in a state of remoteness,” “full of ecstatic excitement” throughout that phase.¹³⁹

In 1845 Fechner wrote up a report on his illness, which Kuntze later printed in the biography that he wrote on Fechner.¹⁴⁰ Fechner's own history of his illness is sober and aloof; he describes in detail the procedures he used to heal himself.¹⁴¹ As the manic phase gradually faded it was also the end of the crisis, although visual difficulties and periodic headaches never entirely ceased.¹⁴² In 1846 Fechner reported to the ministry for culture that while his health had been restored, he still felt unable to return to his former profession “because neither can my eyes tolerate keen observation, nor my mind tolerate mathematical thinking.” He requested permission to lecture on philosophical topics.¹⁴³

Several attempts have been made to explain Fechner's period of illness. In Leipzig in 1894 the neurologist Paul Julius Möbius (1853–1907), a friend of Fechner's, spoke of “akinesia algera” or “lack of mobility due to the painfulness of movement without tangible cause of pain” with a neurasthenic pre-history. In 1925 the analyst Imre Hermann (1889–1984) interpreted Fechner's illness psycho-

analytically. He suspected an uncured Oedipus conflict and interpreted the problems as an “intrauterine regression.” That seems superficial and questionable. In 1970 the physician and historian of psychiatry Henri F. Ellenberger tied Fechner’s illness to “heavy neurotic depression with hypochondriac symptoms, possibly complicated by damage of the retina.” In 1976 the psychologists Bringmann and Balance came to the conclusion that Fechner suffered from a complex psycho-neurosis with compulsive, depressive, and hypochondriac facets. Finally, in 1991 the historian of medicine Christina Schröder and the clinical psychologist and physician Harry Schröder diagnosed a “depressive psychosis with hypomanic to manic post-variation,” encouraged and initiated by chronic exorbitant demand and exhaustion.¹⁴⁴

1.9 The Day View’s Origins

After overcoming the crisis, Fechner, as a private scholar, occupied himself with philosophical and scientific topics, glad to be rid of lecture obligations in physics.¹⁴⁵ Although he retained the title of professor for physics, he considered himself merely a supernumerary at the university, though it continued to pay him a modest salary. Without being obligated to do so, in the summer of 1846 he began once again to give lectures on topics that presently interested him. He first lectured “on ‘the greatest good,’ later on philosophy of nature, on ‘the final things’ [i.e., on life after death], on anthropology, on the seat of the soul, on the relationship between body and soul, on psychophysics and on aesthetics.”¹⁴⁶ He held one lecture series on the “fundamental relationship between the material and the physical principle” fourteen times between 1846–1874. The success of these endeavors was limited, few students came to hear him lecture.¹⁴⁷

In 1845 Fechner once again published some writing. It began with a short article in Poggendorff’s *Annalen der Physik* [Annals of Physics] “On the Link between Faraday Induction Phenomena and Ampère’s Electro-Dynamic Phenomena.” It is Fechner’s last piece dealing exclusively with physics, but it is also his most important in that field.¹⁴⁸ Just as Gauss, Weber, and Franz Neumann later also tried to do, Fechner attempted to link the two different laws of electricity that were known at the time. This paper written in 1845 put physics in Germany on a new course until Maxwell’s Field Theory took its place. In chapter 4, we will discuss these events in some detail.

After publishing this piece in physics, Fechner proceeded to publish on en-

tirely different topics. First evidence of this new creative period appeared in 1846 as “On the Greatest Good,” in which he sketched a naturalistic ethics and tried to draw some ethical conclusions from his doctrine of immortality. Again using the pseudonym Dr. Mises he published a satire titled *Four Paradoxes*.

In the first paradox he advocates the thesis that shadows are alive. The second paradox suggests, half in jest and half in seriousness “to consider the variable t (time) a fourth coordinate in space.”¹⁴⁹ This appears to be the first time in history that anyone has suggested, in a thought experiment, the idea of a two-dimensional being on a flat surface. In the third satire Fechner makes fun of how some of his contemporaries increasingly banish the belief in miracles from religion, yet defend all kinds of adventurous nonsense as well-founded convictions in science, medicine, and philosophy. Their arguments could just as well prove that witchcraft works. Here Fechner heaps a fair amount of ridicule on Hegel, as he continues to do in the fourth paradox,¹⁵⁰ where he uses the dialectic method to “prove” that beginning with the self-motion of a concept, the world cannot have resulted from an originally creative principle, but from a destructive one.

In his work on the greatest good, which followed from the first lecture he gave after recovering, Fechner believed to have found the source of a worldview that would unite all the various elements that seemed so incompatible to him before his crisis: Oken’s philosophy of nature, the romantic-aesthetic attitude, physics, late idealism. He came to call this worldview the “day view” in contrast to the “night view” of the mechanistic world concept.¹⁵¹ All of his writing to follow is for the most part mosaic pieces filling in this view, be they of a philosophical or a scientific nature. Once he had formulated it, he did not really further develop his day view except in *Ideas on the History of Creation and Development of Organisms* (1873).

By “the greatest good” Fechner means “the final purpose, to which all human thinking and action, devising and planning should be directed, not only for the individual, but in terms of it, it should unite all people.”¹⁵² Once one has determined what “greatest good” means, one can also know what the greatest “moral principle” is. According to Fechner, the greatest good for individual humans and for man in general is “pleasure.” Every moral rule is guided “on the whole by a gain in pleasure.” The general principle of this rule, the “pleasure principle” states that: “Man should, as much as he can, seek to bring the greatest pleasure, the greatest happiness whatsoever into the world; seek to bring it into the whole of time and space. Reducing dullness means the same as increasing pleasure.”

This highest normative principle rests, according to Fechner, on a fundamental fact: “All of a person’s subjective and objective motives for action, whatever they may be called and whichever part of nature to which they are related, all of his motives and purposes include an aspect of pleasure, either openly or covertly, consciously or unconsciously, and easily recognizable for an analyzing mind.” All beings have a “desire for pleasure” within them, pleasure is “vitaly, causally connected to everything that exists and is effective in the world.” Fechner goes on to say that “No motive exists that is not directed towards creating or maintaining pleasure, or eliminating or preventing displeasure.”¹⁵³ God himself, as a spirit, finds pleasure in bringing each individual and the entire universe closer to the ultimate goal of the greatest pleasure. Evil in the world is always only temporary. Taking up ideas from the *Little Book on Life after Death*, Fechner views hell and paradise as states which each individual creates for himself. The world is set up such that displeasure—or evil in the world—is always transitory. Whoever acts contrary to the pleasure principle punishes himself and everything else with displeasure. But “God lets what is harmful be devoured by its consequences, and what is good is multiplied by its seeds.”¹⁵⁴ Although there is apparently so much disaster, evil, and pain in the world and although it may increase for certain periods of time, in the long run within the world, pleasure will always increase.

Fechner saw the enormous merit of the pleasure principle in the fact that it is established on experience of the “empirical nature of man and things.” Accordingly, he disagrees with Kant’s verdict that eudemonism is unsatisfactory because it turns morals into an empirical theory. The categorical imperative is justified, but it must be filled with empirical content. Fechner asks, “How can a theory of action, that must prove itself empirically, be itself independent of what is empirical? To me that would be as if physics were abstracted from the empirical nature of bodies and movement, or as if it were developed solely in the mind—something that has, granted, been attempted, but with which success?”¹⁵⁵ The effect of an unempirical attitude in ethics has always been that “the empirical side of life in turn disregards the morals of science.” With this decidedly naturalistic view of ethics, Fechner adheres (whether or not he is aware of it) to one of Oken’s dictums, found in the latter’s philosophy of nature: “Philosophy must grow out of the philosophy of nature, just as the blossom grows out of the stem . . . Philosophy or ethics without a philosophy of nature is nonsense, a complete contradiction, just as a flower without a stem is nonsense. . . . The reason why thinkers in the philosophy of mind still run around without a foundation and

without a compass lies solely in the lack of knowledge of nature of those who write and teach philosophy.”¹⁵⁶ The fact that man’s existence is determined by pleasure and pain is the most important “insight in nature” for Fechner’s ethics.

Fechner’s writing was echoed not only within internal discussion among university philosophers, but also within the political events of the on-going revolution of 1848. He reports, for example, on being accused that his ethics condone “the most dangerous communist, emancipatory and egalitarian tendencies.”¹⁵⁷ This is not surprising because in the final chapter he analyzes Christian aversion to pleasure in clear words: “Individual lust of the flesh” is only “reprehensible” if a conflict arises between the individual’s pleasure and the “principle of pleasure,” namely “divine commandments.” It is not conclusive from this that generally every “pleasure is meaningless and despicable; and this has brought forth monks, mortification, and sermons condemning the pleasure of this world.”

His appeal to pleasure eventually culminates in the vision of pleasure-attuned religion and morals: “One day morals and religion will come, not as the destroyer of what has been, but as the flowering of what has been, returning the word ‘pleasure’ to its right honor. It will close monasteries, open up life, and revere art, and yet consider the Good more holy than the Beautiful, namely not just what generates present pleasure, but also future pleasure and all that goes with it.”¹⁵⁸

In a subsequent essay of 1848, in reply to a review written by Hermann Ulrici, Fechner forms his empirically established ethics into a philosophically significant doctrine. Here he more precisely explains how pleasure and pain determine man’s actions and direct the will. Our actions are “always and inevitably determined by the pleasant and unpleasant character of a thought about the planned action or its omission, or its consequences.”¹⁵⁹ He takes this for a psychologically proven fact. But the pleasant character of a future event is never important for our actions. It is not the expectation of pleasure, not the *idea of pleasure*, but the *pleasure of the idea*, the pleasure of expectation, that determines action. Even love is merely a motive created by the pleasure of an idea. Fechner gives a poignant illustration involving the case of Curtius, who supposedly leaped to death for his country. He did not do so believing that he would thereby win future pleasure by inducing a pleasurable event, he leapt solely because he *presently* found the thought very pleasant that through this act he might achieve fame and rescue the country.

The fact that human actions are often not compelled by pleasant ideas does not contradict the claim that our actions are guided by pleasant ideas—just as the law of gravity is not contradicted by a balloon ascending in the sky. Fechner

thinks that cases like this merely demonstrate the existence of various layers of motives for behavior and that pleasant ideas can be rendered ineffective by opposing motives. Usually these opposing motives are of a moral nature.

The fact that we actually do experience pleasure caused by some ideas and a lack of it because of others and that this happens in degrees is in part based on instinct and in part a result of individual development. All of our “experience, instruction, and thought related to pleasure and displeasure and which we have experienced consciously” either consciously or subconsciously causally effects all subsequent motives and determination of will: “The more one studies how other people and oneself have been instructed by God and other persons, the more one discovers that precisely this after-effect [of prior pleasure and pain and thoughts about them] is crucial and confirmed.”¹⁶⁰ This outline of Fechner’s teachings on the principle of pleasure sufficiently shows that here Fechner is speaking as a psychoanalyst. We shall return to the question of how Fechner influenced Freud in chapter 7.

Within the year 1848 Fechner also presented a book called *Nanna—or On the Soul Life of Plants*. The direct occasion had been a mystic experience he had had in October 1843, towards the end of his crisis. For the first time in a long while he was able to take a walk through the garden without covering his eyes and he literally soaked-in the beauty of the flowers.¹⁶¹ He saw everything in exaggerated clarity and believed to perceive that the plants’ souls were “glowing.”

In *Nanna* Fechner tries to prove that plants have souls, using scientifically sober, albeit sometimes long-winded explanations. He meant that plants also have their own psychic side, which only they and no one else can apprehend. He rarely concentrates on positive reasons *supporting* the theory of plant animation, but instead tries to refute the opposing *skeptical* arguments. The main arguments included the following: Plants have no nerves, they possess no central organ, they are incapable of voluntary movement, they serve no purpose of their own, one cannot imagine the life of their souls.

Fechner’s counter-move is to outline a functionalistic mind-body theory. Long before Putnam and Fodor, the American philosophers generally heralded as the founders of functionalism in the contemporary mind-body debate, Fechner imagined that mental states could be realized somehow other than by the brain.¹⁶² He often borrowed illustrations from music: Just as we can play music on the violin as well as on the flute, feelings can be manifested by something other than nerve tissue and brain mass.¹⁶³ Fechner’s subsequent reflections on the mind-body problem all rest on this functionalistic notion.

Two of Fechner's rare specimens of brief, clear explanation are lectures given in 1849 at public meetings of the Royal Saxon Society of the Sciences—one on "The Mathematical Treatment of Organic Shapes and Processes" on the occasion of the king's birthday on May 18; the other "On the Law of Causality" commemorating the anniversary of Leibniz' death on November 14. Fechner had been a founding member of the Society and became the vice secretary for the section on mathematics and physics in 1848.¹⁶⁴

Both speeches aim to show that nature can be subsumed under mathematically formulated laws even if in the world these phenomena are subject to indeterministic variation. Natural science loses none of its universal nor its necessary character, even if the world is really as Weisse described it in his system of freedom. These two speeches laid the foundation for Fechner's mathematical statistics, a field which he worked in for the rest of his life. Both papers are highly significant for the history of indeterministic thinking. We shall analyze them in detail in chapter 8.

In 1851 Fechner wrote the book he considered to be his major philosophical work: *Zend-Avesta or On the Things of Heaven and the Afterlife: From the Standpoint of Meditating on Nature*. Therein he compiled all the topics hitherto elaborated in his philosophy and cultivated them further. He enhanced the functionalistic doctrine of the animation of plants to include the stars and the whole universe.

This work has three parts. The first two deal with the "Things of Heaven," the third with the "Things of the Afterlife." In the first part, which we could call a sort of religious cosmology, Fechner attempts to demonstrate the plausibility that the earth, heavenly bodies in general, and the entire universe is animated. The problem arises of how an individual can be part of a greater psychic being without losing his individuality. Fechner solves it by presenting a theory of the psychic levels of the world. Consciousness of living individuals belongs to the consciousness of the earth, which in turn belongs to the divine consciousness of all things.

The second part consists almost entirely of appendixes to the first. Topics are repeated, widened, studied in depth and supplemented by reflections on method. The third part, finally, further details the subjects of the *Little Book on Life After Death*, equating future life by analogy to life of memory.

The most important passage of the *Zend-Avesta* can be found in an appendix to the second part. Here Fechner develops his "fundamental view" of the relationship between body and soul: "Behind all of this writing" says Fechner,

“lies a basic notion of the relationship between the body and soul or body and mind, which seems to include the primary foundation for the harmonious link of otherwise very heterogeneous, actually contradictory appearing ways of viewing the world or basic tendencies in philosophy.”¹⁶⁵

Fechner’s mind-body theory is an empiristic and phenomenistic continuation of both Oken’s and Schelling’s Spinozism, and thus an “identity view,” as Fechner calls it. It later came to be called the “dual perspective theory,” “psycho-physical parallelism” or the “double aspect theory.”¹⁶⁶ Hidden in an addition to this appendix is also a “new principle of mathematical psychology,” in which slumbered the first germ for the basic idea of psychophysics which were to unfold later.¹⁶⁷ In his own words, on “October 22, 1850 at dawn in bed” Fechner came upon the idea of making “the *proportionate* increase in living energy . . . be the measure of the *increase* of pertinent mental intensity.”¹⁶⁸ At Harvard University this date was later celebrated as “Fechner Day,” the day when psychophysics began. Whether or not this was justified is questionable.¹⁶⁹

On the whole, the *Zend-Avesta* (which means “living word”) is tedious reading. Long-winded boring descriptions alternate with carefully explained details mixed with terse to-the-point and profound analyses; edifying observations on the verge of bigotry and piousness, written in pietistic pamphlet style, follow keen methodological discussions. The book lacks systematization and the main points are often stuck somewhere in additions to appendixes, while themes of lesser importance are discussed at length in almost eccentric reverie. The style ranges from a careless conversational tone to polished rhetoric. It also includes very personal remarks, impressionistic pictures, poems and long quotations from books in every imaginable field of science.

No wonder the book was not well received. Julius Schaller, a *Naturphilosoph* of Hegelian provenience, complained that the work lacked “concise determination in thought.” While he called it “aphoristic metaphysics,” at the same time he deemed the fundamental tendency of the book valuable, a tendency toward the same direction exhibited by Humboldt’s *Cosmos*: “The idea of the Whole, the unity of all appearances in nature is to be developed. And this unity, as Fechner describes it, is the most penetrant, intensive unity imaginable, it is the unity of the Soul, the Mind conscious of Itself.”¹⁷⁰

Naturally, the reasons for *Zend-Avesta*’s failure were not purely stylistic. In the 1850s, materialism (which should preferably be called ‘philosophical naturalism’) of the type advocated by Vogt, Büchner, Moleschott, and Czolbe dominated the scene. Traditional philosophy suffered a severe identity crisis following the decline of German idealism. Academic philosophy and philosophical endeavors

in general enjoyed little esteem. Add to this the post-revolution repression in Germany, which university philosophy strove to escape by imposing far-reaching limitations on itself.¹⁷¹ Natural science and humanities began to go noticeably separate ways.

The leading science at that time, physiology, saw within grasp the explanation of nature and man using principles from physics and chemistry; in research it followed the maxim that organisms are commanded by the same forces and laws valid for unanimated matter. Consider Helmholtz's *Erhaltung der Kraft* [Conservation of Force] (1847), the source of origin for the influential bio-physical school.¹⁷² This setting did not tolerate ruminations about plant-souls and a world-soul. Fechner's claim that his approach was compatible with the most recent work in physiology, and that it was ideologically neutral, could not change that. Five years later, in a sarcastic and self-ironic tone, Fechner described the fate of his theory of souls: The idea of the plant-soul found undivided applause among the ladies, "spoken and written laudation, from friends and strangers." The chief reward for his writing and the symbol of its success was a crooked carrot that had fallen to his lot; a lady from Altenburg, with whom he was not acquainted, had sent it to him from her garden "as a sign of her interest in my book."

"Almost the same undivided rejection" reverberated among scientists, philosophers, and even theologians. No one took sides for the plant-soul. The first group saw "philosophy of nature barging in with a world-soul, . . . the others saw complete pantheism barging in. It does not help to protest that one is not a philosopher of nature, or a pantheist in this or that sense."

Fechner sympathized with his publisher: "Poor Voss! He printed 1000 copies of the *Zend-Avesta*, but sold only 200! Those few were probably mistaken for a novel like *Nanna*. . . . And if a natural scientist happens to grab it, only to find that the *Zend-Avesta* is a doctrine of the souls of the stars, he drops it immediately in dismay: 'Plant-soul, world-soul, fool's soul! If only the author had stuck to what he does best; he has done better in the past; this must reflect some remnant of his illness.'" ¹⁷³

1.10 Written Work after 1851

In 1855 Fechner published a book on the principles of physics called *On the Physical and Philosophical Theory of Atoms*. Besides the *Little Book on Life After Death* it was to become the only publication in the "day view" manner to see two editions within Fechner's lifetime. The book appears to have met with some

approval among physicists and philosophers alike. It would seem that after the catastrophe of the *Zend-Avesta* Fechner was determined to prove that he could stick to what he did best, namely physics, but also that he wanted to show that the teachings of *Zend-Avesta* were fertile for physics and had remarkable consequences in store.

In this book, Fechner advocates a decidedly scientific realism regarding atoms. He surveys evidence in physics and chemistry that in his opinion supports the thesis that the fundamental structure of matter is atomic, and he vehemently defends this against philosophical objections. He augments scientific arguments with general philosophical reasons, ultimately tying them in with the “day view.” Affronting the tradition of all the philosophical schools existing at the time, he claims that these reasons are not of an a priori nature, but that they are generalizations and extrapolations based on scientifically accepted facts. And with the same vehemence he had applied to defending atomism, Fechner tries to show that no theory of monads can be deduced therefrom, on the contrary, one gets “Syneciology.” He disagrees with Herbart, I. H. Fichte and—without mentioning them by name—with many natural scientists such as Helmholtz, who (at least implicitly) assumed that ‘the soul is situated at one point’ and does not fill out the entire animated body.

In his sometimes quite satirical and highly witty book *Professor Schleiden and the Moon*, of 1856, Fechner presents two entirely different topics that only go together in his ingenious conceptual acrobatics. The first chapter is a very recommendable, dense, self-ironic, and poetic survey of all his previously published works expounding his new worldview. But the real subject (of the first part) is a rhetorically brilliant refutation directed at Matthias Jakob Schleiden, a botanist and founder of cell theory. Schleiden, an advocate of a Jakob-Friedrich-Fries sort of Kantianism, had derided Fechner’s doctrine of plant-souls: “There exists almost no scientific absurdity which Fechner has not ridiculed under the name Dr. Mises . . . , of which he is not just as guilty of committing under his own name, or even worse than those whom he scourged.”¹⁷⁴ Schleiden was so impressed by Fechner’s reply to his banter that he later visited him in Leipzig and they resolved their dispute.¹⁷⁵

In the second part Fechner moves on to questions of the moon’s effect on the weather, plant growth, illness, and so on. He uses statistical methods for the first time and surveys an enormous amount of data about the moon’s influence—data he has gleaned from scientific journals. This work seems to refute the idea that minimal factors (secondary causes) balance each other out over time and are therefore negligible.

The year 1860 finally brought forth the great work that made Fechner famous: *Elements of Psychophysics*.¹⁷⁶ In two volumes totaling 907 pages, Fechner establishes experimental psychology based on quantitative measuring methods. The *Elements*, preceded and followed by a series of shorter pieces written on related topics, are of an entirely different character than most of Fechner's previous books. These volumes are thoroughly scientific, packed with formulas, collected data, reflections on method, minute descriptions, and discussions of difficult experiments. A tie to the "day view" is made with just a few lines, but made unmistakably. The work was addressed above all to physiologists and philosophers.

Fechner's purpose with the *Elements* was twofold: For one, he intended to establish a new branch of science—psychophysics, the science "of the functional or dependency relationships between the body and the soul, or more generally, between the bodily and mental, or the physical and psychical world." Beyond this, he also wished to demonstrate that his philosophical "fundamental view" of the relationship between the body and the soul is not absurd after all; it can be founded on an "exact doctrine," which, like physics, is based on "experience and the mathematical linking of facts."¹⁷⁷ One gathers, as Wilhelm Wundt did, that since Fechner's theory of souls either went unnoticed or met with hostility, he changed his "tactics" and now attempted to establish his worldview—as it were—"from a different angle."¹⁷⁸

Since in Fechner's opinion every "exact doctrine" must first measure its objects of investigation, psychophysics too must demonstrate that psychical dimensions are measurable. (This task can be neglected for physical dimensions, since physics already studies and performs this kind of measurement.) Fechner draws several conclusions from the principles of gauging sensations, including things that are not directly observable. He calls this the field of "inner psychophysics." It deals with the relation between mental and bodily activity that is directly tied to sensation. Many of the findings that Fechner presented in this work resulted from joint experiments done with his brother-in-law Alfred Volkmann, the physiologist mentioned above.

At first only a few, albeit important scientists took note of the *Elements of Psychophysics*. Boring gives us a list of scholars discussing Fechner's *Elements* throughout the 1860s: Helmholtz, Mach, Wundt, Volkmann, Aubert, Delboeuf, Vierordt, and Bernstein.¹⁷⁹ Contemporary periodicals carried apparently only one review, actually only a report of the contents, rather than an analysis of the book.¹⁸⁰ The first edition of the *Elements* had a print-run of 750 copies; 277 were sold within a year.¹⁸¹ In 1875 Fechner's publisher suggested terms for a second edition, but the project was not accomplished during Fechner's lifetime.¹⁸²

In the *Elements of Psychophysics* Fechner announces a forthcoming supplement promising far-reaching consequences for religion and the philosophy of nature, consequences resulting from the “most general form of psychophysics.” His conclusions were meant to “anticipate the future goal of psychophysics, erected on the fundamental principles provided in this work [namely, the *Elements*].”¹⁸³ The announced essay was soon published in 1861 titled *Concerning the Soul. Passage through the Visible World, in Search of the Invisible World*. It exhibits Fechner’s clearest treatment of his “fundamental view” and evidences his effort to overcome the stylistic imperfections permeating *Zend-Avesta*. Here Fechner’s line of thought is inclusive and systematic. He recapitulates the reasons supporting the notion of plant-souls and the earth-soul, presenting them more precisely and abstractly than before.¹⁸⁴

The same work also contains a detailed exposition of “empirical principles of belief,” in other words: an epistemology. By “belief” [*Glauben*] Fechner means all assumptions (of religious and nonreligious kinds) for which, while they cannot be “proven exactly”—meaning that they cannot be directly demonstrated in observation—there nonetheless exist empirical reasons making those assumptions at least empirically probable. Fechner further developed this epistemology, which shares some important features with pragmatism, in 1863 in the book *Three Motives and Reasons for Belief*. Therein he sketches various principles for judging the probability of beliefs.

Beginning around 1865, Fechner devoted himself to another area that he envisioned exploiting for the purpose of enhancing the “day view,” namely: aesthetics. Between 1865 and 1872 he wrote fourteen articles on aesthetic topics, and in 1876 he published two volumes called *An Elementary Course in Aesthetics* [*Vorschule der Aesthetik*], crowning those endeavors.¹⁸⁵ Starting with the claim he had expressed in *On the Greatest Good*, stating that all of man’s behavior is a function of the pleasure of his ideas, he takes this notion a step further to claim that man’s aesthetic judgments are also functions of the pleasure of such ideas and sensations, as these are elicited by aesthetic objects. Once again, Fechner strives to chart facts, or empirical laws, that underscore empirical aesthetics, instead of “supervening” a priori aesthetics, namely aesthetics that proceed from general ideas to particulars. For him the whole purpose and method of aesthetics relates to psychophysics.

Fechner’s aesthetics begins with Zeising’s investigations into the rule of the golden mean. An aesthetic impression must be subject to various conditions, if it is to arouse desire or aversion. Fechner distinguishes here between a direct and

an associative factor. An aesthetic impression's direct factor is determined by a large number of varying principles, among others, the "principle of uniformly linking diversity," the "principle of lack of contradiction, of unanimity, or of truth" and the "principle of clarity."¹⁸⁶ The associative factor concerns the cultural background which in part determines our aesthetic reaction. Our aesthetic judgment is connected to a variety of ideas via memory and habit, ideas of which we are aware to varying degrees while experiencing an aesthetic impression.

The entire theory is interwoven with prolonged ruminations on method. Fechner would have liked to discover a way to directly measure the degree to which something affords us satisfaction or dissatisfaction. But since this is not testable, we must be content with information on how many people prefer one particular aesthetic impression over another. Here for the first time Fechner employs the concept of "collective object," a term on which he later established a system of mathematical statistics.

Fechner sought underpinnings for his aesthetic theory by designing an experiment for an art exhibition featuring two versions of a Madonna portrait painted by Hans Holbein, The Younger. He wrote up lengthy questionnaires and distributed them among the visitors at the exhibition, in an attempt to discover which of the two paintings was considered more beautiful. Unfortunately, a mere 113 of the 11,842 visitors completed the questionnaire, rendering the findings negligible. But Fechner has the honor of being the first researcher to have contrived a questionnaire survey for psychology and to have interpreted the results statistically.

Besides being absorbed in aesthetics, Fechner contributed to the raging debate on Darwinism and the evolution of species. In 1873 he published *Some Ideas on the History of the Creation and Development of Organisms*, to which we shall return in chapter 7. In the foreword to this publication Fechner admits that "after resisting the doctrine of descent for quite some time" he was finally convinced. He goes on to praise Haeckel's *Natural History of Creation* for presenting Darwinian theory with such lucidity that it affords "clear insight" into it.¹⁸⁷ The purpose of Fechner's book is to examine very general principles of development which would encompass both Darwinian theory of evolution and a theory of development of a philosophic nature, thereby reconciling them. The so-called principle of the tendency toward stability, which is closely related to the second principle of thermodynamics, plays a fundamental part in it. An irreversible direction of progress is immanent to nature; in the long run, it moves from absolute spontaneity and irregularity to extreme stability. The whole concept is linked in a grand manner to psychophysics, eudemonism, and the "day view": The physical

tendency towards stability serves as a bearer of the psychological tendency to increase pleasure in the world. By the end of his life Fechner had done much to prepare a second edition of the *Ideas*, but was no longer able to complete it.¹⁸⁸

After Fechner had basically completed his work on aesthetics, he returned to psychophysics and elaborated his position in answer to the controversies that his ruminations had elicited. None of his prolific ideas aroused as much interest as the notion of measuring mental dimensions. Belated public awareness of the *Elements of Psychophysics* turned into stormy debate throughout the 1870s. We shall discuss this in chapter 6.

In 1877 Fechner analyzed the objections brought forth by his critics and published his defense: *The Case for Psychophysics*. A thick *Review of the Main Points of Psychophysics* followed in 1882, in which he not only replies to his most acerbic adversary Georg Elias Müller from Göttingen, but also presents an updated substitute for the *Elements* of 1860, which by then were out of stock.

1.11 The Day View as Contrasted with the Night View

Between the issue of both publications in defense of psychophysics, Fechner published *The Day View as Contrasted with the Night View* (1879)—a work that perhaps is even more Fechner's prize piece than the *Zend-Avesta*. Here he summed up his own philosophy and astutely discussed the intellectual tendencies of his time. For the first time he engaged himself in comprehensive philosophical polemics.

The *Day View* goes back to a manuscript written in 1871 that originally was planned to refute Eduard von Hartmann's *Philosophy of the Unconscious* and bore the title of "The Day View in Contrast with the Night View of Consciousness." It seems that Fechner rewrote it several times, before finally completing it.¹⁸⁹ As we learn from a letter written by an enthusiastic Fechner admirer, the Viennese physician Josef Breuer, and addressed to the philosopher Franz Brentano, the crucial impulse for finishing the book appears to have come from a Viennese student and author originally from Galicia, Siegfried (Salomon) Lipiner (1856–1911). Breuer reports: "Lipiner can pride himself on being the one to have urged Fechner to condense his otherwise quite diffuse exposition, oscillating as it does between poetry and logical explanation, into a compendious, readable, and comprehensible book; this is how the "day view" was produced."¹⁹⁰

Lipiner was something of a precocious genius, who maintained personal

friendship with Richard Wagner, Friedrich Nietzsche, Nietzsche's friend Erwin Rhode, and particularly with Paul Natorp and Gustav Mahler.¹⁹¹ For a while he enjoyed fame for his poetry *Prometheus Unchained*, published by Breitkopf and Härtel in Leipzig in 1876. Lipiner studied philosophy under Brentano in Vienna, changing to the university at Leipzig for the winter semester 1875–1876 and the following summer term. He became friends with Fechner, as a former student of Fechner's relates: "Usually Lipiner had very few acquaintances, at least among fellow-students. I observed him more often accompanying the elderly, admirable Professor Fechner, the honorable psychophysicist and aesthetician, which surprised everyone, since the aged gentleman left his house only unwillingly . . . And here this queer fellow got the old man to stroll in Rosental Park just like everyone else."¹⁹²

Lipiner had also joined the "academic-philosophical club" in Leipzig, where he swaggered and drew attention with his considerable eloquence, just as he had done in the "Vienna German Students' Reading Club."¹⁹³ In a lecture given to the Vienna Reading Club in 1878 *On the Elements of Renewing Religious Ideas Today*, which caused quite a commotion, Lipiner mentioned Fechner and the astrophysicist Karl Friedrich Zöllner as authorities for the contention that "the main doctrines of all true religion" must not contradict science and that science itself inspires us to "idealistic and even theistic notions."¹⁹⁴

One of Lipiner's friends was young Sigmund Freud (1856–1939). Together they coedited a philosophical periodical from 1874–1875, vigorously exchanging ideas until at least 1877.¹⁹⁵ Certainly Freud and Lipiner discussed Fechner, for their philosophical ideas were similar. In 1874 Freud wrote twice to his childhood friend Eduard Silberstein, studying in Leipzig at the time, asking him for information about Fechner and his teaching.¹⁹⁶ He also probably heard of Fechner's ideas in Brentano's philosophy courses, particularly since Brentano corresponded with Fechner in 1874 on his most recent publication *Psychology from an Empirical Standpoint*, and on how to gauge sensations.¹⁹⁷

The Lipiner episode is characteristic of how at that time intellectual circles of the Danube monarchy were linked to those of Leipzig. The bond is reflected by the fact that the cultural circles of Austria-Hungary took more note of Fechner's work than did those of Prussian Germany. From 1872–1878 the University of Leipzig counted more students than any other German university;¹⁹⁸ it was apparently quite attractive for Austrian students and the top choice for studies outside the country. Theodor Gomperz, Heinrich Braun, Thomas Masaryk, Eduard Silberstein and Edmund Husserl all studied for some time in Leipzig. Professors

were also exchanged between the universities in Leipzig and Vienna; the physiologists Ewald Hering and Karl Ludwig held chairs at both institutions.

The perhaps pivotal factor tying the intellectuals of the Danube monarchy to many scholars in Leipzig was that both were deeply influenced by Johann Friedrich Herbart's philosophy. In the pedagogical reform of 1848 Franz Exner (1802–1853), a philosophy professor who had been summoned from the University at Prague to come to the Vienna Ministry for Education, saw to it that Herbart's philosophy and pedagogical doctrine were adopted throughout Austria—a feat that equally prevented German idealism from flourishing there.¹⁹⁹ By the turn of the century Vienna and Prague had become strongholds for Herbartian philosophy. As noted in 1.4, Leipzig was the heart of the German Herbart school. Herbartianism in Austria (which notwithstanding its own metaphysical underpinnings was critical of metaphysics, abhorred idealism and admired empiricism) was open for Fechner's psychophysics. One of Exner's students, the Herbartian Gustav Adolph Lindner wrote a *Textbook for Empirical Psychology* used as a course text in philosophy in upper grades of Austrian high school and in which he mentions Fechner.²⁰⁰ Even Freud read this book in school.²⁰¹ The common background that favored Herbart's philosophy created a kind of immunity to neo-Kantianism after 1878 in the academic life of Leipzig and the Danube monarchy.

The “basic points” of the *Day View* run as follows: Physical appearances are not sensation states belonging to perceiving beings; they exist objectively in the world, they are outside of subjective consciousness. In terms of perceptual theory, then, Fechner advocates a variety of “direct realism” and rejects the doctrine of secondary qualities: Perception is immediate acquaintance with an external object and its properties. All appearances are interconnected within the highest consciousness. The psychical part of human nature also belongs to divine consciousness, and this divine consciousness is the inner side of the divine body, namely, the outer material world. We can draw conclusions about the nature of the afterworld from our knowledge of the constitution of this world.²⁰²

For Fechner this starting point suggests solutions to all kinds of philosophical and scientific challenges: Teleology, pleasure and pain, determinism and indeterminism, the mind-body problem, causal law, evolution theory, and so forth. His “day view,” he says, is an “equal opponent” for the “two major tendencies exhibited by the prevalent night view”—one (tendency) which tries to “generate the entire contents of the world from the a priori emptiness of abstract concepts,” as well as the other, that limits “human knowledge of the world to knowledge of

our own subjectivity.”²⁰³ Philosophically, then, the day view contradicts both Schelling/Hegel theory and Kant/Schopenhauer theory.

Fechner begins with a dramatic charge against both mechanistic materialism’s and philosophical pessimism’s night view. These two approaches leave the world cold and barren and with all the despair of Hades; all vitality, every color, sound, and fragrance is merely subjective illusion. Fechner contrasts this devastation with the redeeming, liberating bright beauty of the “day view,” where violins and flutes do not “pretend” to make sounds, and butterflies do not “pretend” to have colors.²⁰⁴

Fechner’s *Day View* is often misunderstood as a backwards, antimodern, and irrational case for spiritual idealists warding off materialistic natural science. One audacious claim even says that Fechner confused the realism of traditional common sense with an erroneous nocturnal outlook on life and the world—only to find a truly meaningful worldview in insanity, mystery, obscurantism, and romanticism.²⁰⁵ He is sometimes even associated with spiritualism. Such interpretations are nonsense. In contrast to the official mechanistic worldview preferred by his contemporaries, Fechner’s work actually sketches a new sort of epistemology, explaining the reality of the mental and the organic, bridging the cleft that separates nature and consciousness, reality and perceptual appearance, and combining science with direct human experience.

Compared to Eduard von Hartmann’s irrational *Philosophy of the Unconscious*, an enormously popular book at the time, Fechner’s day view is very rational; its tenets always allow critical empirical scrutiny. While we can’t deny that some of Fechner’s motives sprang from (late) romanticism and religion, this alone does not render his opinion irrational and cannot cancel any significance it may have for the future. Fechner’s day view is an attempt to understand science in a way that reunites science with the real world of people, with all the ethical and aesthetic implications involved, instead of excluding them from it, as mechanistic materialism does.

We may question the worth of Lotze’s claim in a review of Fechner’s *Day View*, that David Friedrich Strauss’s very influential and popular creed for materialism, *Old and New Belief. An Avowal* (1872), is “in every respect the perfect embodiment and depiction of the worldview that Theodor Fechner calls nocturnal and hopes to see expelled by the revival of a day view.”²⁰⁶

Naturally, it may apply to some of Strauss’s blunt opinions that do indeed conform to the mechanistic concept of the world. But it does not apply to this theologian’s “heathen religious” side, namely his pantheism, nor to his opinion

that the difference between materialism and idealism is merely a matter of words.²⁰⁷ Notwithstanding a heart-felt sympathy for Fechner's book, Lotze disqualifies Fechner's literary soaring and notes that "the analogy's bridges between this world and the next are not stable enough to entice one to set foot upon them."²⁰⁸

In the year that he died, 1887, a longer article by Fechner given the title "On the Principles of Measuring the Mental and Weber's Law" appeared in a periodical edited by Wilhelm Wundt, *Philosophical Studies* [*Philosophische Studien*]. With youthful enthusiasm Fechner once again dove into the debate on psychophysics. Wundt found this contribution "the clearest and most complete exposition of the matter given at all throughout the nearly forty years Fechner labored at it."²⁰⁹

From among the huge selection of papers Fechner left for posterity, a posthumous book called *Theory of Measuring Collectives* was edited in 1897 by the psychologist and psychophysicist Gottlob Friedrich Lipps. Here Fechner—as it were—freehandedly sketches a new sort of mathematical statistics that is closely connected to the notion of freedom cradled by late idealism. This outlook can be traced back to ideas on indeterminism that Fechner had already once expressed in 1849. This book is also the source for interpreting probability as frequency, a method that was to become highly significant for the twentieth century.

1.12 Fechner's Life after Recovery

After Fechner abandoned the university position in physics his finances were a source of endless worry.²¹⁰ The ministry for education gave him half-pay, at first 850 talers, then 600, later more.²¹¹ He remained a member of the faculty for philosophy at the University of Leipzig, holding the title of professor for physics. But he no longer held any office; he was not given a chair for the philosophy of nature, as secondary literature often suggests. Except for lecturing, Fechner was not active in university life. He did participate regularly in meetings of the Royal Saxon Society of the Sciences. After the demise of his friends Weisse (1866), Hermann Härtel (1875), Ernst Heinrich Weber (1877) and Karl Friedrich Zöllner (1882), there were few left to keep him academic company.

There is little to report on the outward circumstances of Fechner's life after he recovered from illness and psychological crisis. He was a bookworm, spending his days absorbed at his desk. He lived in the same quarters (No. 2 Blumen-gasse, nowadays called Scherlstrasse), a stone's throw from the center of Leipzig's

old downtown area from 1850 until his death. Kuntze and Wundt describe a typical Fechner workday: He labored from early morning until one o'clock in a small, austere chamber, sitting on a stool or standing at the high desk.²¹² After a scanty lunch he strolled to Leipzig's Rosental Park (now the zoo), had an afternoon coffee at Café Kintschy and read the newspaper. Occasionally he played a game of chess there. At home again, he continued to work until late in the evening. He also often sought distraction by visiting friends, relatives, or acquaintances in Leipzig's society. Once a week he gave a two-hour long lecture at the university.

The only extravagances he allowed himself were afternoon coffee and an enormous amount of stationery. As he aged he read less and concentrated on writing down every thought that occurred to him. At the invitation of a friend he often took summer vacations with his wife, without interrupting his work. In 1875 the ministry relieved him of his teaching duties at his own request. His eyesight faltered and he underwent various cataract operations in Halle, performed by the ophthalmic surgeon Gräfe. But otherwise, he maintained good health until his last day.

In 1877–1878 Fechner was “almost involuntarily”²¹³ involved in spiritual meetings with the American medium Henry Slade (1840–1904) and the Danish mesmerist Hansen, having been brought along by one of his friends, the astrophysicist Karl Friedrich Zöllner (1834–1882). At the time, Slade's seances were a sensation all over Europe.²¹⁴ In 1872 Zöllner had begun a campaign against the alleged signs of decline in the established natural sciences by writing a piece called *On the Nature of Comets*. His polemic had been particularly directed at leading representatives of natural science in Berlin. Zöllner became acquainted with spiritualism in 1875 in England and imagined therein a great way to prove his theory of a four-dimensional, positively warped universe. He needed four-dimensional space in order to prove that the law of gravity was reducible to Wilhelm Weber's basic law of electrodynamics; a project he had already been laboring at for quite some time. It was related to his idea that from the darkness of the sky and other facts, one can deduce that the universe is non-Euclidean.²¹⁵ After 1878 Zöllner's polemics became manic and pathological, sometimes ending in wild anti-Semitic tirades.

It severely damaged Fechner's scientific reputation at the time to have been caught up in the ruckus surrounding Slade and Zöllner.²¹⁶ One chapter of the *Day View* cautiously, skeptically, almost reluctantly admits the possibility of spiritualistic phenomena. It is understandable that someone like Fechner, who

himself had so often pondered the notion of life after death and advocated mental functionalism would be curious about parapsychology.

The ultimate reason for believing that Slade's experiments were not trickery and swindle after all, as he had originally thought to be the case, were testimonies given by the Leipziger mathematician Wilhelm Scheibner (1826–1908) and particularly by his friend Wilhelm Weber, who, in Fechner's opinion, "embodied the spirit of exact observation and logical methods."²¹⁷ But Ernst Mach, who personally witnessed the spiritualist scene in Leipzig, reports that Fechner was not alone in not relying solely on his own experience as proof and initially needing affirmation by another in order to be fully convinced. In the end, each member of this spiritualist circle named one of the others as a decisive, competent authority.²¹⁸

In evaluating the episode of spiritualism and Fechner's role therein, we should not overlook the fact that although Fechner liked Zöllner, their opinions diverged at significant points. Zöllner was a Kantian, zealously lecturing on Kant's work,²¹⁹ as well as a devotee of Eduard von Hartmann and Schopenhauer—all philosophers that Fechner disdained. Zöllner taught a monadical, hylozoic theory of souls that attributed sensibility to matter itself, while Fechner advocated synechology, in which the property of having a soul is an emergent property of complex systems.²²⁰ Although Fechner thought that spiritualism might perhaps support his theory of life after death, he desired that the day view be judged independently of any link with it. If spiritualism had nothing to offer philosophy, Fechner was convinced that it could hardly be used for proof in scientific conjecture, as Zöllner had done for the notion of the fourth dimension of space.²²¹ Fechner's contemporaries did not see these distinctions clearly and lumped Leipzig's spiritualistic professors together, particularly when viewed from distant Berlin, the seat of the professors most often attacked in Zöllner's polemics. The commotion caused by Zöllner temporarily damaged the reputation of non-Euclidean geometry, also bringing disrepute to Helmholtz's work on the subject.

When evaluating the conflict sparked between scientists in Leipzig and Berlin by scholars dabbling in spiritualism we must also keep in mind that as of 1870, Helmholtz and Wilhelm Weber were involved in an ongoing dispute on whether or not Weber's basic law of electrodynamics fulfilled the law of the conservation of energy.²²² It bothered Helmholtz that according to Weber's principle the force between two electric "masses" (today called "charges") depends not only on the inverse square of the distance between them, but also on their relative velocity and relative acceleration. In *Conservation of Force* (1847) Helmholtz denied the existence of velocity-dependent forces. In 1872 Zöllner joined the dispute with

his book on comets. His criticism eventually resulted in an all-around attack on the inductive method of the British physicists William Thomson, Peter Guthrie Tait, and John Tyndall—all friends of Helmholtz. Two years later, Helmholtz retorted that these reproaches represented a relapse into metaphysical speculation, disparaging “Zöllner and his metaphysical friends.”²²³

As far as we know, the last eye-witness account on Fechner is that given by the chemist Wilhelm Ostwald. In his memoirs he relates that on the occasion of being called for a chair at the University of Leipzig he made an inaugural visit to Fechner just a few weeks before the elderly scholar passed away. The report testifies to Fechner’s spryness right up to his last day:

I consider it a special deed of fortune that I was able to personally meet Gustav Theodor Fechner, the founder of quantitative psychology. I had read much of his work and had long revered this rare personality . . . Just entering his house felt like coming home—the floor in the foyer was strewn with white sand, the way it was done where I came from. In spite of his advanced age he was as nimble as a youngster. He had heard of me, probably through Wundt, and inquired immediately whether all the gaugings I had undertaken included any in which one and the same value had been measured repeatedly. For he was preoccupied with the theory of measuring collectives and sought as much diverse data of this kind as possible. Unfortunately I had no such data to offer, otherwise I would have gladly seized the opportunity to see him again. He quickly involved me in vigorous conversation and I was unhappy to break it off, when the time came for me to leave.²²⁴

Despite all of his scintillating, vivacious ideas, Fechner’s work habits had something compulsive about them. He feared nothing as much as boredom, and without intellectual tasks he suffered ennui. Even in the final diary entry written prior to his death he complained that his faltering eyesight “often forced him to be embarrassingly bored” so that he took walks “to kill time.”²²⁵ Neither were the topics he covered really matters of his own choice; he felt compelled: “He was enslaved to them.”²²⁶ Bringmann and Balance calculate that for the period between 1843 and 1887 Fechner wrote twenty-six books and sixty-one articles totaling approximately eight thousand pages of print.

According to Kuntze, Fechner was not prone to lengthy correspondence, but he was visited by numerous scientists from all over the world.²²⁷ One diary entry is a spirited and detailed report on a particular visitor, Dr. Thomas Masaryk, who later became the president of the Republic of Czechoslovakia.²²⁸ Masaryk was twenty-six years old at the time and sought contact with professors and publishers in Leipzig. It is also known that Franz Brentano visited Fechner in Leipzig,²²⁹

as did Ernst Mach, Carl Stumpf, and the American psychologist Granville Stanley Hall.²³⁰

Fechner had no devotees in the narrower sense of the word. Kuntze mentions Wundt and Preyer as members of the younger generation closest to him. Beginning in 1876 Fechner corresponded regularly with the Swabian rural physician, advisor for medicine in Stuttgart, and honorary doctor of the University of Tübingen, Wilhelm Camerer (1842–1910), who, upon recommendation from his former teacher, the physiologist Carl Vierordt from Tübingen, had approached Fechner with questions about the psychophysics of the tactile sense. He eventually became Fechner's closest coworker. In the 1880s Camerer published articles on the tactile and gustatory senses in the *Journal for Biology* [*Zeitschrift für Biologie*]. Fechner himself noted in one of his articles on the spatial sense that he wrote it in conjunction with Camerer.²³¹ Fechner perused all of these publications prior to printing and commented on them in correspondence. Camerer visited Fechner in 1883.²³²

Fechner died in Leipzig on November 18, 1887 after suffering a stroke twelve days earlier. Three days later, Wilhelm Wundt read a funeral oration at the burial in the Johannis-Cemetery. Ten years thereafter, Paul Julius Möbius donated a Fechner monument (renovated in 1983) to the Rosental Park in Leipzig.