Striving for the Whole

Creating Theoretical Syntheses

Rainer Diriwächter
and
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Preface:
The Past and Future of the Whole

Rainer Diriwächter
California Lutheran University

Jaan Valsiner
Clark University

Psychology—just like many other disciplines—is still far removed from presenting a unified theory. Instead, we still find a number of schools of thought, each with their own theoretical orientation which is often at striking odds with those of competing schools. Moreover, the institutionalization of theories has traditionally shifted over time, so that we can continuously witness recurring themes emerging (see van der Veer & Valsiner, 2000). In short, it seems that currently the unification of psychology remains predominantly a disciplinary maneuver rather than an epistemological act as one would imagine it should be (see Stam, 2004).

One of the central aims of this current volume is to bring back to psychological discourse the often-neglected ideas of early twentieth century holistically oriented schools of thought. We have found that, all too often, present day mainstream psychology demonstrates little theoretical and philosophical orientation at its core. Instead, we can find a large flux of largely data-driven articles that are published in various journals without serious regard to how their results fit with larger theoretical perspectives.

Data are important—but only if they speak the language of theories and help to modify theories (see Holton, 1998 on Einstein's thinking). Psychology is far from a stance of theoretical clarity—and it is precisely for that reason that an inquiry into the holistic nature of its phenomena is in order. While no single school of thought can claim to have achieved the necessary breakthrough in presenting a unified theory of psychology, the holistic approaches have gone a far way in placing the notion of "unity" beyond any data-driven approach. That is, for truly holistically related approaches, the empirical component needs to be integrated with a general life theory that breaches the boundary of a limiting laboratory setting.

At the heart of most holistic approaches to psychology, we find the intellectual ideas of the Second School of Leipzig: Genetic Ganzheitspsychologie. It is their theoretical credo that openly and clearly aims at a unified theory of psychology. This stands in strong opposition to the data-driven approaches, which usually result in so-called "mini-theories" that merely touch upon certain aspects of human life (cf. attribution or social exchange theories). It is true that the Leipzig Ganzheitspsychologie cannot claim itself to be the originator of holistic ideas, as their approach rests upon the shoulders of early giants of psychology—Franz Brentano, Alexius Meinong, Hans Cornelius, Christian von Ehrenfels, and others. Yet, the Leipzig circle could boast to have mastered the leap between lower and higher psychological processes by uniting both into a whole. That is, to take Wilhelm Wundt's strict distinction between studying simple elementary processes of psychological functioning (such as sensations) and the higher, more complex functions such as language, myths, and customs which originate in social life.

As such, this volume should serve as the basis for professionals and students alike to discuss the necessary foundations for creating theoretical syntheses and, in the end, how to achieve a truly holistic approach that is grounded in solid theory that guides subsequent research and its accompanying methodology. We believe that taking a look into our intellectual past, with a keen eye on our future, will help spur renewed research that breaks free of the data-driven approach that has forgotten to see the larger picture (i.e., the forest behind all the trees).

Hence, the collection of writings[1] the reader will find in this volume largely serve as self-standing pieces that reflect upon a given topic with an eye towards how that topic could relate and be integrated into a holistic approach.

Part I—The Whole and Ganzheitspsychologie

There are many starting points which would be well suited for a discussion surrounding holistic theories of psychology. We have chosen to intercept the time-line of holistic theoretical development at the point where Gottfried Wilhelm von Leibniz (1646-1716) enters the stage. The impact of Leibniz's theories on psychology is often forgotten. While at one time the early intellectual giants paid homage to Leibniz's contributions to psychology (see Wundt, 1917) today, his teachings have largely been contained within philosophy. In our first chapter of this volume, Walter Ehrenstein discusses some of Leibniz's ideas in regards to dynamic holism and its true unity. A key anchor point for discussion surrounds the active units and interactive dynamics of the whole, and naturally Leibniz's famous monadology, which highlights the primacy of the whole.

The central topic of Chapter 2—the contributions by Christian von Ehrenfels (1856-1932)—may be somewhat more easily recognizable as an important contribution to holistically oriented theory by anyone who has spent some time with Ganzheit and Gestalt psychology. Steven Kissinger provides a recount of Ehrenfels' 1890 seminal paper on Gestalt Qualities, which is generally considered a milestone, albeit certainly not the only one, for holistically oriented research programs by both the Berlin (Gestalt) and Leipzig (Ganzheit) psychology circles.

As mentioned earlier, while no unified theory of psychology has emerged to this date, there is no single theory that can claim to be more holistic, yet still grounded in empirical rigor with life's structure intact. That is, a theory that has not removed itself from the reality of life—that being of genetic nature—thereby preserving the structural and developmental complexes that make up our psychological necessities. This approach—Genetic Ganzheitspsychologie—tries to account for everything from the simplest complexes to the most broadly conceived metaphysical explanations, whereby the latter is just one aspect in a long spectrum of provisions. A truly holistic approach—as well as a unified theory of psychology for that matter—will be able to account for, and not shy away from, all issues involving human nature. This reaching from the smallest, moment-by-moment transformative occurrences (speak Aktualgenese or Microgenesis)—as become evident through time-limited studies demonstrated through Wohlfahrt's (1925/1932) studies of emergent percepts or Werner's (1925) studies on micro-melodies—to the broad ranging questions of who we humans really are. Let us not forget that much of psychology one hundred years ago was seen as a branch of (experimental) philosophy, and not natural sciences as (largely for political reasons) institutions today advocate. Yet such institutional blinding of the discipline cannot last for long—the need for generalizable knowledge in psychology will sooner or later overtake the social positioning games of "schools" of psychology. For us, there are no "schools" but different thinkers and researchers who have tried to make sense of complex psychological phenomena.

In order to gain a better appreciation for what the discipline of Genetic Ganzheitspsychologie actually entails, Rainer Diriwächter summarizes its main principles in Chapter 3. The emphasis in that chapter is not only placed on the historical past of Ganzheitspsychologie, but also includes recent developments on both the experimental as well as the theoretical levels, thereby paving the way for further potentials.

The near absence of discourse surrounding Ganzheitspsychologie today could lead some readers to believe that this German approach never made it beyond the borders of German speaking Europe. However, this is not entirely true. As Wellek (1954) recounts, prior to World War II, Ganzheitspsychologie ideas were being exported to countries such as Argentina, Italy, Romania, Sweden, Greece, even the United States and Japan. In all these countries we find translated texts by Krueger and others, with subsequent own developments which, unfortunately, seem to have transpired after the onset of World War II. It would be a worthwhile task for any researcher native to these afore mentioned countries to take a stroll to the library archives and re-examine these texts and their initial impact on the psychology of that country.

For our current volume, we have selected Japan as one example of how intellectual ideas can migrate to far away places—at least temporarily—and how often it necessitates the "right" *Zeitgeist* for something to grab foot. In Chapter 4, Miki Takasuna and Tatsuya Sato provide the reader with a glimpse into Japan's history of psychology and relate it to Felix Krueger's Ganzheitspsychologie. One would imagine that any Eastern country would be particularly receptive to holistic ideas, and so it is particularly interesting to read that it's not just general life philosophies of a majority that dictate what and who becomes embraced, but often also a political elite that may (ab)use certain doctrines to their own advantage.

Yet we must not forget that at the heart of any intellectual approach stand people who are committed and fascinated by what their philosophy promises. Dietmar Görlitz gives us a rare personal account in Chapter 5 of what it was like to study at Heidelberg under Johannes Rudert—an assistant of Felix Krueger in Leipzig. Görlitz's discussion highlights the intellectual discussions, the meaning-making process at Heidelberg, inclusive of philosophers, and, at that time, psychologists work in process.

Part II—The Whole in Other Minds

It would be wrong to claim early twentieth-century efforts towards holistic psychology as exclusively German. For example, the legacy of the South African statesman and philosopher Jan Smuts reaches all the way to Anglo-American holistic psychology. In Chapter 6, Christopher Shelley gives us a good overview of Smuts's life and work, with an emphasis on personality theory. Furthermore, Shelley ties the legacy of Smuts's approach to those of Adler, Meyer, and Perls. It is particularly the latter which may surprise one or the other reader who mistakenly thought the famous Gestalt therapy has direct links with the Berlin approach. In fact, as Shelley points out, it seems the South African and German holistic approaches ran parallel to each other and largely ignorant of their respective advances during those times.

One often and surprisingly neglected aspect of psychological research is the centrality of feelings and emotions that stand at the core of every human experience. While the Leipzig Ganzheitspsychologie had made feelings one of their core areas of interests, they were certainly not the only ones. In Chapter 7, Tania Zittoun discusses the French physician and philosopher Pierre Janet, with particular emphasis placed on the various facets of human emotions and how to channel Janet's ideas into today's psychology. French holism, Janet's whole of human conducts in particular, can boast many good ideas that beg for renewed consideration.

One of the most promising areas of modern day psychology has made its' prime target the examination of how humans' system of organized psychological functions takes place via semiotic mediation (see Valsiner, 2000). Cultural psychology spans many disciplines, from anthropology, ethnology, linguistics, and biology (just to name a few). At the core lie the discoveries of psychological necessities which underlie human psychological functioning. As Krueger (1915: 177) mentions, psychological necessities constitute the core of all we call "culture"—they are the carriers and inner movement which represent the forming forces of every cultural development.

In Chapter 8 of this volume, Lívia Simão introduces us to the cultural psychology of Ernst Boesch and demonstrates its holistic orientation by contrasting it with Ganzheitspsychologie. Of particular importance is Boesch's symbolic action theory, which not only accounts for the importance of semiotic regulation but also captures the non-static nature in human lives. Cultural psychology should be examined from the perspective of developmental sciences—a general orientation that puts the word "Genetic" before Ganzheitspsychologie not only for the Leipzig circle. Simão does a good job in highlighting the subject-object and temporal relationships of a person (actor), through symbolic actions, through the prism of a holistic cultural psychology. The comparisons with Pierre Janet and Jean Piaget help to situate Boesch's approach and in the end help pave the way for a truly Sociogenetic Ganzheitspsychologie.

Part III—The Whole in Biology: Making Sense of Others' Ideas.

Some readers may be surprised to find in a volume devoted to the history and development of holistic approaches not one, but two chapters dedicated to the ideas of Conwy Lloyd Morgan. This especially since what became known as Morgan's canon—that one should not interpret an action as the outcome of the exercise of a higher psychical faculty if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale (Morgan, 1894/1977: 53)—has quite conveniently become a rallying point for behaviorists. Yet, the inclusion of Morgan need not necessarily be so surprising after all: As Valsiner discusses in Chapter 9, Morgan's comparative approach—indeed resting upon Ockham's Razor (or the principle of parsimony)—did in no way claim one should oversimplify the subject matter. As Viney and King (2003) point out, some people might argue that by following Morgan's canon, the extreme speculative nature and anthropomorphism of some early comparative psychology could give way to another extreme—that of "preferring precise explanations that may meet the test of simplicity, but fail to do justice to the richness and complexity of the living organism" (p. 181).

As is often the case, the reality of original ideas differs from their later reconstructions. We have reprinted the chapter from Morgan's *Introduction to Comparative Psychology* (Chapter 10 here) to demonstrate that Morgan emphasized the simplicity of explanation on the background of systemic—holistic—organization of the biological phenomena. His ideas gain new light today—when our modern protein genetics discovers complex causal systems of interaction of functional units in the genome that give rise to relatively simple biological structures (e.g., such as 19000 genes of *C. elegans* granting the life of that 1000-cell nematode). The question is no longer how to find simplest explanations but how to reconstruct the simplest of the variety of complex causal systems that explain the outcomes.

Morgan was a philosopher first and naturalist second—his contributions to the ways in which knowledge emerges are very contemporary. By emphasizing the meaning-making scientist whose intuition is as important as careful observation he set the stage for a century of debates on the objectivity of the scientific enterprise. Accepting the subjectivity of the scientist in the construction of objective accounts of reality was a bold step—and worth careful consideration in our time.

Any theory of psychology, a holistic one in particular, needs to also account for the organism's biological make-up and eventually how biological changes may have come to form. In Chapter 11, Camilo Khatchikian reviews the history of holism in biology. Early holistic approaches in biology are often underemphasized. Human interest in biology predates any written record. Our stories begin with the Greeks, whose ideas have been passed down through the ages, recurring in the so-called scientific revolution, the vitalism-mechanism debates, and still guide our present-day discourses. When it comes to holistic approaches, Hans Driesch's study on sea urchin eggs has done much to suggest that developing organisms do not proceed in a mechanical, but rather in an integrative holistic manner. The idea that biological systems are due to their organization, that is, their hierarchies and properties as advocated in Ritter's philosophy of organicism has also found its way into the theories of Werner and Wapner.

Perhaps none other than Darwin's theory of evolution has done more to solidify present-day views on how we, as humans, have come to be. His writings have helped capture the imagination of biologists and psychologists alike. Yet it is interesting to note that current evolutionary theory in psychology surprisingly lacks adequate and explicit discussion on the developmental and holistic nature of evolutionary processes. In the final chapter of this volume, Rosemarie Sokol and Philip Rosenbaum take a closer look at evolutionary psychology, and, by contrasting it with Developmental Systems Theory as well as Ganzheitspsychologie, suggest a new theoretical model of evolutionary psychology that is both developmental as well as holistic in nature—Evolutionary Developmental Psychology.

Rediscovering the Whole—and Making it Meaningful

Science is close to art—even if we study elementary phenomena we are after general knowledge—like art is to evoke generalized subjective understanding. Yet it is not clear how to proceed in this focus on the whole. Our whole book centers on one issue—what to do with the whole? The implications from taking Ganzheitspsychologie seriously require that the researcher accounts for *all* the complex qualities of the whole as such qualities—and is careful in any moves to reduce those to individual constituents. Broadly speaking, this implies not only a momentary snapshot of the whole, but also a capturing of the fluidity of the phenomena at hand. Thus, a truly holistic approach needs to be developmental (genetic) in nature, and attempt to describe its components as well as processes all inclusively—from the biological foundation to the metaphysical integration. We hope that the readings in this volume provide triggers for embarking on new theoretical pathways to discovery and keep focus on the qualities of the wholes as those are subjected to various limitations through inquiry.

Note

Chapters 3, 4, 6, 7, 11, and 12 are revised versions of earlier publications appearing in the journal *From Past to Future, Volume 5, No. 1,* 2004. Chapters 9 and 10 appeared in the journal *From Past to Future, Volume 4, No. 1,* 2003.

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Leibniz's Dynamic Holism*

Walter H. Ehrenstein
Dortmund University

Leibniz's philosophy is perhaps best known for its *principles* (of sufficient reason, continuity, differentiation, least effort, and pre-established harmony; see Ortega y Gasset, 1958) and for the idea that the rules of reasoning can be represented within a formal symbolic system to allow for computational or artificial intelligence (Davis, 2000). Yet, the emphasis placed on Leibniz's rationalism has to some extent obscured the robust role that Leibniz saw for sensory experience, observation, and experiments in establishing factual or contingent truths to complement necessary or axiomatic truths.

With respect to life sciences, Leibniz provided a remarkable framework for investigating complex, organic, and particularly mental phenomena by conceiving the surface organization of phenomena as dependent on a deeper order of underlying micro-processes so as to account for the emerging organization (Duchesneau, 2003). In particular, Leibniz postulated genuine units (monads) as autonomous and predisposed tendencies of living activity resulting in a multitude of original worldviews. Unity and activity were the concepts on which Leibniz's metatheory of being, his *dynamic holism,* essentially relied. Before going into this further, let us briefly turn to Leibniz's remarkable life and career with outstanding achievements apart from philosophy.

Biographical Sketch

Gottfried Wilhelm Leibniz (1646-1716) was born into a pious Lutheran family in the Saxon city of Leipzig, Germany, near the end of the Thirty Years' War. His father, Friedrich (1597-1652), was a professor of moral philosophy at Leipzig's renowned university, at which his son enrolled as a student already in 1661. In his bachelor's thesis "On the Principle of the Individual" (1663)

*Dedicated to Lothar Spillmann, neuro-perceptual pioneer, on the occasion of his 70th birthday.

Leibniz emphasized the value of the individual as a whole essence (*entitate tota*), not sufficiently described by matter or form alone. In 1666 he became qualified to lecture philosophy with a thesis "On the Art of Combination," which anticipates some basic principles of modern computation, emphasizing that all reasoning may be generated by an ordered combination of elements, be it verbal (words, numbers) or nonverbal (colors, tones). His application for the degree of a doctor of law was, however, refused because of his (too young) age. As a consequence he went to the University of Nuremberg, located at Altdorf, where his dissertation "On Perplexing Cases" procured him the doctor's degree of law at once followed by an offer of a professor's chair in 1667.

Leibniz, however, declined the offer for an academic career and instead entered the service of the nobility. It was the Baron of Boineburg, a minister of the Elector of Mainz, who first employed him as a lawyer and diplomat. His duties took him to Paris, where he stayed from 1672 to 1676. Soon after his arrival at Paris, he lost his protector by death and thus was free to pursue his scientific interests. In search of financial support, he constructed a calculating machine which he presented to the Royal Society during a short visit to London in 1673. His intense studies of mathematics culminated in his invention of the infinitesimal calculus late in 1675. Leibniz sought a permanent position in Paris, but his efforts were in vain.

In 1676 he entered the service of the Duke of Hanover and remained there for forty years until his death in 1716. Serving this major German noble house (that became the British royal family by the end of his service), Leibniz played a major role in the European politics and diplomacy of his time. Remarkably, he managed to combine his work as a courtier with intellectual interests and activities of the most varied kinds. He served as a librarian and was instrumental in founding the Academy of Sciences in Berlin, Vienna, and St. Petersburg. His intellectual merits excel in mathematics and philosophy. He invented the differential and integral *calculus* independently of Newton (1643-1727) and his notation is the one in general use since. He introduced the *binary system* on which modern computer architectures rely. With Descartes (1596-1650) and Spinoza (1632-1677), he is regarded to belong to the three great seventeenth-century rationalists, but only recently historians of philosophy took notice that his approach was markedly less rationalist than Kant (1724-1804) had suggested. Rather, Leibniz stood "on the interface between the holistic and vitalist world-view of the Renaissance, and the atomistic and mechanistic materialism that was to dominate the eighteenth and nineteenth centuries" (Ross, 1984:1). Besides, we owe Leibniz seminal contributions to a multitude of rather specialized topics in which he anticipated notions that surfaced much later in biology, cybernetics, geology, medicine, physics, psychophysics, and neuroscience; he also wrote on economy, ethics, ethnology, history, law, linguistics, and theology (see Aiton, 1985; Jolley, 2005). Many of his ideas were far ahead of his time to be taken up with great delay—sometimes not until today.

The access to Leibniz's work is difficult, since his contributions are scattered in journals, in tens of thousands of letters, and various unpublished manuscripts. Only two books, *Combinatorial Art* (1666) and *Theodicy* (1710) were published during his lifetime; two more books appeared posthumously—his *Monadology* (composed 1714) in 1720 and, in 1765 with huge delay, his *New Essays on Human Understanding* (completed 1705). To date, there is no complete edition of Leibniz's writings, hence a full account of his work is not yet possible. Much of what is published has been so only in recent decades. Leibniz wrote in three languages: French, Latin, and (least often) German; only a small proportion of his writings is available in English (see Gregory Brown's on-line bibliography: http://www.gwleibniz.com/).

A Universal Genius to be Recognized as Pioneer in Holistic Psychology

Leibniz's life was so rich of various activities with achievements in so many and distinct areas that he may be best characterized as *Universalgenie*, a "universal genius" (Ross, 1984). In taking every of his single achievements in the context of everything else he did, single contributions are indeed prone to rival with and to obscure each other. The eminent mathematician, logician, engineer, philosopher, and physicists he was, he is hardly identified as a psychologist. Thus, it may come as a surprise even to experts to recognize Leibniz as a still underappreciated "pioneer of psychology" (Fancher & Schmidt, 2003), who particularly anticipated key issues of Gestalt psychology and *Ganzheitspsychologie* (Ehrenstein, 1983).

In fact, Leibniz is rarely mentioned in current textbooks of psychology, although one of the founding fathers of modern psychology, Wilhelm Wundt (1832-1920), had devoted him a whole monograph (Wundt, 1917). While Wundt was able to appreciate Leibniz as a philosopher of mind, as the one who conceptualized minute sensations that led Fechner (1801-1887) to develop his psychophysics, and as a pioneer in cross-cultural psychology (e.g., his detailed linguistic and ethnographic studies of China and other cultures) he could not yet foresee Leibniz's role in a most recent field of psychology, that of *artificial intelligence* and *virtual reality*. "With his general conception that reasoning processes are reducible to mathematical-like computations, which in turn could be performed by machines, and with his anticipation of the binary notation that underlies the workings of modern digital computers, Leibniz deserves at least the title of intellectual grandfather to the modern movement of artificial intelligence" (Fancher & Schmidt, 2003: 12).

Even more astonishing is the neglect of Leibniz in the field of holistic approaches to psychology. We look for his name in vain in the representative texts such as of Ehrenfels, Koffka, Köhler, Krueger, Metzger, Uexküll, Volkelt, or Wertheimer (though see for some exceptions: Allport, 1955; Anschütz, 1953; Ehrenstein, 1947, 1965; Graumann, 1960; Huber, 1951). It is as if one had failed to see the forest for the trees. As we will see, the idea of Gestalt-like, supra-additive wholes is so central to Leibniz's thinking that one is easily led astray, if one, in the tradition of Kant, tends to disregard its key significance.

Leibniz's Search for Principles of True Unity

Initially, Leibniz was much impressed by the simplicity of the new atomic theory as set forth by the French philosopher Pierre Gassendi (1592-1655). His search for *real unities*, however, left him soon dissatisfied with its rather collective or accumulative assumptions of coherence. In his *New System of the Nature* (1695), he reports on his intellectual development that led him to adopt and conceptualize a holistic alternative.

> At first, when I had freed myself from the yoke of Aristotle, I had believed in the void and atoms, for it is this which best satisfies the imagination. But returning to this view after much mediation, I noticed that it is impossible to find *the principles of a true unity* in matter alone, or in what is merely passive, since everything in it is but a collection or accumulation of parts *ad infinitum*. Now a multiplicity can be real only if it is made up of *true unities* which come from elsewhere and are altogether different from mathematical points, which are nothing but extremities of the extended and modifications out of which it is certain that nothing *continuous* could be compounded. Therefore, to find these *real unities*, I was constrained to have recourse to what might be called a *real and animated point* or to an atom of substance which must embrace some element of form or of activity in order to make a complete being. It was thus necessary to recall and in a manner to rehabilitate *substantial forms* which are so much decried today, but in a way which makes them intelligible and separates the use which must be made of them from their previous abuse. I found then that their nature consists of force and that from this there follows something analogous to feeling and to appetite; and that therefore it was necessary to form a conception of them resembling our ordinary notion of *souls*. But just as the soul must not be used to explain the detail of the economy of the animal's body, so I judged in the same way that these forms ought not to be used to explain the particular problems of nature, although they are necessary to establish true general principles. Aristotle calls them *first entelchies*; I call them, more intelligibly perhaps, *primitive forces*, which contain not only the *act*, or the fulfillment of possibility, but also an original *activity*. (Leibniz, 1995: 116-117, emphasis in the original)

From his mathematical studies, in particular his method of the infinitesimal calculus, Leibniz knew how to analyze a complex variation (differential) and, conversely, how to gain a whole from a given value (integral). The idea of infinitesimal units that afforded such mathematical flexibility served to develop an alternative to the materialistic and mechanistic models. Leibniz asked for indecomposable units instead arguing that any material particle, no matter how small, can still to be subdivided further—hence, an ultimate material particle as a building block of the universe could be hardly obtained.

Furthermore, Leibniz's access to the then newly constructed microscope, by courtesy of Anton van Leeuwenhoek (1632-1723), afforded him to observe at first hand the amazing spectacle of microorganisms within a drop of ordinary pond water. This gave rise to a vision of a universe filled with hierarchies of organisms, to the conception that "each portion of matter may be conceived as like a garden full of plants, like a pond full of fishes"; it led Leibniz to adopt active or vital properties, force or energy, as primal entities.

Active Units and Interactive Dynamics

Leibniz faced two major contemporary cosmological accounts. Atomists such as Gassendi postulated discrete atoms, but had problems to explain their composition into continuous wholes. Conversely, Cartesians took spatial continuity as their point of departure, but failed to account for discrete objects out of it. In order to resolve this dilemma, Leibniz assigned elementary physical units to points in geometric space and interpreted these units as centers of force. Mathematically, the infinitesimal calculus allows for such an operation in that differential geometric points on space curves are assigned acceleration vectors which correspond to physical forces, if the curves are conceived of as motion trajectories. Thus, energy constituted the essence of matter and the world consisted of an infinity of centers of force, permanently expressed in motion. Leibniz's explanation of matter and space tried to avoid circularity in that his energy particles were themselves neither material nor, strictly speaking, even spatial.

Moreover, Leibniz challenged the conventional view of mechanical interaction. Although we tend to picture force as a *thing* which is transferred from one body to another, it is not a thing at all, but only a quality or state of things. Consequently, a force cannot literally be transferred from one body to another, any more than, say, a headache or color. Even in the case of balls ricocheting off each other on a billiard table their motions are permanently dependent on various other conditions, such as gravitational forces acting on them, properties of the table and its felting, air currents, and so on.

> In fact, the resultant motion of a particular ball is more like the expression of the solution to an infinitely complex equation, than like receiving the baton in a relay race. Leibniz was quite right to interpret the laws of mechanics, not as laws governing the amount of force transferred from one colliding body to another, but as elegant mathematical formulae governing the evolution of whole complex systems from their state at one time to their state at the next. (Ross, 1984: 86)

An important distinction in this context is that between *active* and *passive* dynamics. Things are active as far as their behavior is spontaneous and passive as far as it is determined by the constraints of the surrounding system. Accordingly, Leibniz assumes two different sources of an individual's dynamics: its spontaneous development or unfolding from within its own impulse or drive and its adaptation to the total system of which it is a part.

Monadology

Leaning on Aristotle's distinction of "sporadic" versus "monadic" ordering (in which several individuals belong to the same species versus in which each individual constitutes a species on its own) Leibniz termed the fundamental unit of his system a *monad* (Greek μόνας, meaning "unit"). Leibniz's theory of units, his *monadology,* is based on the primacy of the whole. Not only do monads share all attributes of non-additive wholes and sub-wholes, the entire universe relies ultimately on a central or supreme monad equated with God. Based on the undeniable reality and immediacy of one's own experience, Leibniz assumes graded consciousness or awareness as prime components. All monads are characterized by a charge of energy or impulse (an inherent urge to fulfill tendencies innate within themselves) that is accompanied by some degree of perceptiveness or awareness. They vary in strength and extent of their perceptive capacities and are organized within a multi-level hierarchy from *simple, sentient*, and *rational monads* to a unique *supreme monad*.

Simple monads with diffuse, subconscious percepts constitute the lowest level. Leibniz called these subliminal sensations "*petites perceptions*" (minute percepts) and compared them with the impression created by a single drop of water in a crashing surf. As a single drop it elicits an indiscernible, although obviously real, percept because in the aggregate with thousands and millions of other minute perceptions it produces the crashing sound of the surf.

Next in the hierarchy are the *sentient monads* affording basic conscious perception and self-awareness. Leibniz used for describing ordinary perceiving with the French verb *apercevoir* ("to perceive, to catch sight of, to foresee") and the higher form with the reflexive *s'apercevoir* ("to perceive oneself"), usually translated into English as "to apperceive." Sentient or apperceptive monads are followed by *rational monads* that allow for comprehending experiences by abstraction from perceptual phenomena and integration into conceptual or theoretical constructions—up to logical or mathematical reasoning. On top of—or most central within—this hierarchic order is a *supreme monad*, an all-comprising unit that is God.

Just as the simple perceptive capacities of an animal in response to its environment are put in shade by a human being who can further apperceive it with self-awareness and in terms of formal symbols, so are the apperceptive and conceptual capacities of humans overshadowed and subsumed by those of God—the supreme monad. Humans have access to only vague glimpses and partial insights into the overall grand scheme as formulated by the omniscient Creator. Here we are reminded of Ehrenfels' (1916) ideas concerning the cosmological implications of his Gestalt theory when he, without reference to Leibniz, speaks of God as the *AllGestalter* (see next chapter by Kissinger).

Leibniz assumed that this grand scheme was fitting to the most perfect possible principles of organization. Yet, not unlike William James' (1909) pluralistic universe, Leibniz allows for an "infinite number of simple substances . . . as if there were as many different universes . . . in accordance with the different points of view of each monad" (*Monadology,* § 57). Besides, Leibniz explicitly specifies that an optimal system's state ("as much perfection as possible") is characterized by a variety within order, this strikingly resembles Ehrenfels' (1916) independently found definition of the "level" of a Gestalt as the product of its degree of unity and the degree of multiplicity (variety):

> And this is the means of obtaining as much variety as possible, but with the greatest order possible; that is to say, it is the means of obtaining as much perfection as possible. (*Monadology* § 58, Leibniz, 1995: 188)

Even the lowest grades of monads are considered to be fairly autonomous in pursuing independent courses; yet, in their vast diversity they are nonetheless coordinated in that they are embedded within a general and reciprocal order.

> Thus there is nothing waste, nothing sterile, nothing dead in the universe; no chaos, no confusions, save in appearance. We might compare this to the appearance of a pond in the distance, where we can see the confused movement and swarming of the fish, without distinguishing the fish themselves.
>
> Thus we see that each living body has a dominant entelechy, which in case of an animal is the soul, but the members of this living body are full of other living things, plants and animals, of which each has in turn its dominant entelechy or soul. (*Monadology,* §§ 69-70, Leibniz, 1995: 190)

The principle of the harmony among the monads does not consequently belong to them, but it is the monad of monads, God, that affords an ultimate unity. What develops in an individual monad is at the same time compatible with all other developments. From a single grain of sand, Leibniz holds, the whole universe might be comprehended if we only knew the sand grain thoroughly. Monads are hence *pars pro toto* representations, reflecting the whole, but according to their respective dominant determinations and particular circumstances.

Leibniz's Holism Reassessed

Leibniz's monadology is not restricted to organic or mental aspects of life, but embedded within a more general cosmological view (see Rescher, 2006). It relies on indecomposable units as centers of force or activity, rather than on inert material elements on which formal principles are imposed; it thus equates substance with force and regards matter, space, time, and motion to derive from these primary forces. This view strikingly resembles that of modern physics, especially of *quantum field theory*, which supposes holistic structure for quantum systems and considers subatomic particles as wave-like energetic variations rather than material entities (Zee, 2003). Furthermore, in conceiving the activity of each monad to follow pre-set rules or programs peculiar to itself as well as applying to the whole, Leibniz echoes modern biology, especially *molecular genetics* (Gánti, 2003). Here we find an intriguing specificity of bodily organs in relation to their cells and, within each cell, nuclear acids or DNA from which the genetic information is passed to the proteins of which the body is largely comprised.

For Leibniz the *whole* is an *a priori* condition of reality. However he does not regard reality as static or absolute, but as variable and graded in that it obeys a reciprocal relation to holonomic function. It is still instructive to follow Leibniz's respective statements as, for example, in his letter to Arnauld of April 30, 1687:

> *I hold that where there are only entities by aggregration, there will not be any real entities..* . . I maintain as axiomatic . . . that that which is not truly *one* entity is not truly one *entity* either. It has always been held that unity and entity are reciprocal things. . . . I do not mean that there is nothing substantial, or nothing but appearance, in the things which have no genuine unity; for I agree that they have always as much reality or substantiality as there is genuine unity in that of which they are composed. (Leibniz, 1995: 66-67, emphasis in the original)

And further, as if out of a current reader on Gestalt psychology, Leibniz already specifies gradual variation of organization in relating wholes to their constituent parts.

> I agree that there are degrees of accidental unity; that an ordered society has more unity than a confused mob, and that an organized body or a machine has more unity than a society – that is to say there is more point in conceiving them as one single thing, because there is more relation between the constituent parts. (Leibniz, 1995: 69)

The idea of gradual variation in holistic organization, of an organic hierarchy, nicely accounts for an infinite complexity of elements interacting at every level, while preserving a genuine autonomy. Each monad "mirrors" the universe, somewhat as the many flashes of light on a million ripples are in reality images of the sun. There is no more theoretical difficulty in supposing visual panoramas of the world to be multiplied in this way than in supposing the same film or program to be run off simultaneously on a million different television or PC screens. Furthermore, neuronal processing of information requires individual translation of impulses from the sensory nerves to generate an own private world-picture; there would be as many such pictures as there are living brains.

Perceptual as well as motor activities are highly organized relying on integrative dynamics of fairly autonomous agents. In particular, the noted Russian neuroscientist Nikolai Bernstein, based on his extensive biodynamic analyses, concluded that the major task of human sensory-motor coordination is to constrain the extreme number of possible body movements, which he characterized as kinematic and elastic, in terms of *degrees of freedom* (see Ganz et al., 1996).

Today, Leibniz might have expressed his theory in more neutral terms of *quantum field theory* or *molecular genetics* (see Auyang, 1999). But in his time, the vitalist and phenomenal model was the only one available for conceptualizing reality as something other than material, atomic, and inert. Terms like "life," "soul," or "perception" were all he had for describing coordinated energy and activity. Hence, we should take his more fanciful expositions, such as the last quoted almost poetic passage from the *Monadology*, metaphorically rather than literally (see Ross, 1984).

Conversely, we meanwhile know that perceptual and mental phenomena, rather than serving as mere metaphors indeed result from, and hence can serve as subtle indicators of, highly coordinated and interactive processes of our brains in response to changes in the environment and/or within the acting organisms (e.g., Ehrenstein et al., 2003; Spillmann & Ehrenstein, 2004). Consciousness is, as Liliana Albertazzi concludes in her metatheory of forms, not *blindly coupled* to corresponding psychophysical processes but "*similar* to them it its *essential structural properties*. This amounts to saying that emotion, perception and thought, as molar phenomena and unfolding processes, have the same *dynamically*-based structure" (Albertazzi, 1999: 296).

Leibniz clearly rejected mechanistic accounts of the mind (*Monadology* 17) pointing out that they would fail even if we had easiest access to the workings of the machinery. "Suppose that there were a machine so constructed as to produce thought, feeling, and perception, we could imagine it increased in size while retaining the same proportions, so that one could enter as one might a mill. On going inside we should only see the parts impinging upon one another; we should not see anything which would explain perception" (Leibniz, 1995: 181).

Certainly, Leibniz's quest for holonomic function, so poorly served by the mechanics of a mill, might be much more met by the integrative power of highly advanced and compact micro-circuitries of present-day computer chips or by the richness of genetic information contained in the DNA within every single organic cell of living beings. Still he might have rejected these impressive embodiments and instead referred to our perceptual and conceptual world as the richest source available to us for representing and understanding holistic functions. For example, perceptual phenomena, that are experimentally shown to be "illusory" in that they deviate markedly from the physical properties of the eliciting stimulus, provide excellent tools for the study of brain functions. They challenge neurophysiologists and computational modellers of brain function alike in that physics alone would fail to predict the perceptual phenomena as well as the brain processes that occur with them (see Ehrenstein et al., 2003; Spillmann, 2006).

Modern psychophysics and brain research strikingly echoes to Leibniz's phenomenalism in resembling holonomic organization, yet without reference to Leibniz, as in the concluding of a recent neuroscience review of vision:

> Seemingly effortlessly, our brains pick up information, process it, and enable us to maneuver in a complex environment. We negotiate our world far better and faster than any robot without stumbling. Why? Because Gestalt factors, the interface between the world and the percept, guide us along. A large number of neurons is not decisive, nor is the speed of processing. Gestalt-like interactions makes the difference. (Spillmann & Ehrenstein, 2004: 1585)

More and more we advance to understand that highly integrated and amazingly complex neuronal structures allow for functional states that are appropriate to the uniting qualities and skillful performances of our cognitive and behavioral worlds. Consequently, neuroscience is revealing to us an ever growing richness of Gestalt-like functioning that comes close to what Leibniz's dynamic holism had envisaged long before.

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