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THE FOUNDING OF ETHOLOGY*

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IT IS OUR GOOD FORTUNE that Richard W. Burkhardt, Jr., has fallen in love with the founding of ethology. Since 1981 he has published 14 papers in this area, and here he presents the grand synthesis: a network of interwoven biographies of the scientists who built behavioral biology. This book exemplifies history writing at its best: ferreting out the relevant sources; reviewing the literature; comparing, checking, and weighing the evidence; and presenting all in a format that dovetails contemporary thought.

Burkhardt starts with a brief introduction, "Theory, Practice, and Place in the Study of Animal Behavior," ending his theoretical considerations with a programmatic statement: "The goal of this book is to analyze historically the construction of ethology as a scientific discipline, paying particular attention to the ways in which, in local and broader settings, the founders of ethology generated, developed, contested, and refashioned the concepts and research practices of their newly emerging field" (p. 4). He introduces Konrad Lorenz and Niko Tinbergen as the central persons: "It was Lorenz who was primarily responsible for laying the field's early conceptual foundations," while Tinbergen "contributed experimental and analytical talents that beautifully complemented Lorenz's early theory building" (p. 4).

In the first two chapters, "C. O. Whitman, W. Craig, and the Biological Study of Animal Behavior in America" and "British Field Studies of Behavior: Selous, Howard, Kirkman, and Huxley," Burkhardt traces the foundations of ethological

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thought to precursors in the United States (especially Lorenz's), and in Great Britain (especially Tinbergen's). This selection reveals his obvious bias in favor of Anglo-American authors by not giving the German forefathers (Heinroth, Kühn, Loeb, von Uexküll, etc.) equal distinction; it also reveals a bias in favor of a naturalistic approach, thus making short shrift of the morphological and physiological forefathers, such as Hochstetter, Pavlov, and Sherrington, who were of special significance to Lorenz's conceptual development.

The central chapters, "Konrad Lorenz and the Conceptual Foundations of Ethology" and "Niko Tinbergen and the Lorenzian Program," combine the biographies of Lorenz and Tinbergen with a concise history of their ethological concepts. Starting with Heinroth's precursor of "species-specific actions" (later known as "fixed action patterns") and von Uexküll's "schemata" (developed into "innate releasing mechanism"), the development is traced through the 1930s, up to World War II. Burkhardt describes Lorenz's Kumpan (companion) paper (1935), which proposed a new approach to the concept of instinct, and the "glorious spring" of 1937, which Lorenz and Tinbergen spent in Altenberg, experimenting on the responses of various species of birds to models of flying raptors and the egg-rolling behavior of the greylag goose.

An equally important episode in the evolution of ethological thought was the beginning of the friendship between Lorenz and Erich von Holst, a young physiologist who "had already distinguished himself through his brilliant experimental researches on the endogenous production and central coordination of nervous impulses" (pp. 208–9), thereby striking a deadly blow at the "chain-reflex-theory" of those days. As a consequence, Lorenz dropped his thesis that instinctive action patterns were based on special, complex systems of chain reflexes. From subsequent discussions, his thesis emerged that instinctive action patterns are caused by spontaneously active "centers," controlled by inhibitory or excitatory stimuli. "When Tinbergen read Lorenz's account, he wrote his friend, saying, 'Your discussion of the eventual identification of the Holstian automatisms and your instinctive action is wonderful'" (p. 210). I am certain that, had von Holst not died in 1962 at age 54, he would have been among the Nobel Laureates of 1973.

Chapter 5, "Lorenz and National Socialism," appears a bit inflated, considering the amount of labor Burkhardt invested in a few opportunistic remarks in four publications and a few private letters written during a relatively short period. By comparison, Tinbergen's wartime experience, by no means less dramatic than Lorenz's, occupies only two pages. Burkhardt's scrutiny is fully justified, however, in view of the ongoing discussions, innuendoes, and accusations regarding Lorenz's early sympathies for National Socialism and the inferred racism of his views about the relevance of behavioral genetics. Burkhardt's careful analysis of numerous personal letters Lorenz exchanged with friends and authorities clearly reveals the extent to which Lorenz was influenced by, and was unable to influence, the powers of his society at that time.

Burckhardt observes that “Lorenz was an aspiring young scientist who sought to advance his research and his career within the complex terrain of National Socialist biology” (p. 232). The political side of the “brown spots” on Lorenz’s white vest can be summarized as follows. There is little doubt that Lorenz set great hopes on the German takeover of Austria in 1938. He wrote an enthusiastic application for Membership in the National Socialist Party, had a photo taken with the party badge on his lapel, and used party line rhetoric in four scientific papers in 1940. But he continued doing outstanding scientific work even though he was drafted into the German Army in 1941—serving his first five months in a motorcycle squadron because he had concealed his medical training. He was first transferred to a psychology unit for two months, then to the medical corps, and finally was sent to the front as field surgeon. He was captured by the Russian Army, and between 1944 and 1948 he served as a physician to his fellow POWs. Lorenz wrote several important papers during the war: the groundbreaking monograph on the comparative study of duck courtship (1941); his profound assessment of “the innate forms of possible experience” (1943); and, while a POW, the first draft of a book that was published as *Behind the Mirror* (1977).

In Chapter 6, “The Postwar Reconstruction of Ethology,” Burckhardt again seeks “to reconstruct the interplay of material, disciplinary, institutional, political, and personal factors that were constitutive of ethology’s reformation in the postwar period” (p. 282). This chapter covers the reconciliation between Tinbergen and Lorenz, expressed in the mutual sigh of relief, Niko’s “We have won” (p. 308; presumably meaning, “we have survived”), and culminating in the 1949 Cambridge symposium “Physiological Mechanisms in Animal Behaviour.” There Lorenz introduced his controversial psychohydraulic model of instinctive action, and Tinbergen presented his equally controversial model of the hierarchical organization of drives—both models trying to account for a fundamental thesis of ethology, that is, an urge inside the organism to act that is controlled by inhibitory and/or excitatory external stimulation. Von Holst was unable to attend the symposium because of ill health, and his paper “Quantitative Messungen von Stimmungen im Verhalten der Fische” (Quantitative measurements of motivation in the behavior of fishes) was handed, unfortunately, to his opponent, Hans-Werner Lissmann, for translation into English as well as for presentation. Lissmann, as Schleidt notes, “was a firm supporter of the idea of peripheral control—the idea that Holst was attacking . . . smirking in the most embarrassing places” (p. 310). It is not surprising that “the Germanic tone of Holst’s paper grated on non-German ears so soon after the war” (p. 311).

Chapter 7, “Ethology’s New Settings,” covers Tinbergen’s move to Oxford and Lorenz’s to Buldern. Burckhardt’s discussion of animal behavior studies at the American Museum of Natural History in this context, notably by T. C. Schneirla, is a bit unexpected. The orientation at the museum was neither ethological nor within the mainstream of American psychology at that time. In the 1950s, psychology was still preoccupied with the legacy of Watsonian behaviorism and

its brilliant heir, Burrhus Frederic Skinner. The white rat in a Skinner box was a very different animal from Lorenz's free-flying wild ravens, geese, and night herons, or from Tinbergen's gull chicks in the dunes of Holland.

Chapter 8, "Attracting Attention," focuses not so much on the increasing recognition of the "Lorenz-Tinbergen school of behavioral studies" as on the critique it drew, especially from American comparative psychologists, notably Lehrman's 1953 paper. Lehrman's critique, mainly of Lorenz's concept of the use of the concept "innate," is also highlighted in Burkhardt's review of the Paris instinct conference in 1954 and of the "Group Processes" conference arranged by the Josiah Macy, Jr. Foundation in Ithaca, New York. While Lorenz stood his ground—or, as Burkhardt felt, "failed to understand what the Americans were driving at" (p. 392)—Tinbergen was much more conciliatory, accepting that ethologists could have been more careful in the definitions and use of their concepts. The chapter ends with a brief account of the "International Ethological Congresses" up to 1961. At least "the founding" had ended, even though nearly two decades passed until Lorenz's *Foundations of Ethology* (1981) appeared in print—41 years after he had signed a contract with his publisher.

Chapter 9, "Tinbergen's Vision for Ethology," comes as a surprise because it breaks the historical continuity. Burkhardt starts with a flashback to Tinbergen's early work in the 1930s and 1940s, reviews important work of his students, and considers the conceptual rift that Lorenz caused in 1961 by his insistence on the fundamental difference between "innate" and "learned," two distinct ways by which experience enters into biological systems: on the species level by evolution (innate), and on the individual level (learning). Tinbergen bridges this widening gap in his 1963 paper "On Aims and Method of Ethology" ("what was to become his single most important scientific paper," p. 408). In an e-mail to me, Burkhardt explained his reasoning for giving Tinbergen the last word:

What I did try to represent in my book was my sense that ethology's development was complicated and difficult, and that it took the extraordinary pair of Lorenz and Tinbergen to bring it to disciplinary status. In this regard, Tinbergen's stance toward Lorenz's career is in the end the stance I would want to leave in readers' minds. It is one that recognizes Lorenz's flaws but at the same time values him as a scientist and a person. I highlight this at the end of the book by essentially giving Tinbergen the last word (through the *Times* obituary that he prepared for Lorenz), and through other of his comments. Not everyone will want to allow Tinbergen's stance to have this role. And I'm sure there will never be a "last word" on all these things. But Tinbergen's stance made a huge amount of difference for ethology's post-war development, and I think it's the kind of story, ending with friendship rather than rancour, is where one would like to end up despite painful incidents along the way." (Burkhardt to Schleidt, July 5, 2005)

The conclusion addresses "topics related to ethology's popular and professional development in the 1960s and 1970" (p. 449) and reflects on the history

of the field in the “ecological setting” of its places and times. Burkhardt starts with the historical climax, his appraisal of the Nobel Prize for medicine in 1973, and ends on a heart-warming conciliatory note: “Crucial for the construction of ethology as a scientific discipline was the way each man recognized and benefited from what was best about the other. In their later years, they wistfully recalled to one another their early days together before the war. ‘What happy times they were!’ remembered Tinbergen, and Lorenz agreed: ‘The summer in Altenberg where we rolled greylag eggs and dug ponds together was probably the most beautiful in my life’” (p. 311).

The book closes with meticulous notes, a bibliography, and an excellent index.

I had the great luck to attend Lorenz’s first lectures at the University of Vienna in 1948. I served as his assistant between 1951 and 1964, carried a major burden organizing three International Ethological Congresses (Buldern, Starnberg, and Washington), established the first bridgehead of ethology on the East Coast of the United States, at the University of Maryland, and served as director of the Konrad-Lorenz Institute of the Austrian Academy of Sciences from 1985 until my retirement in 1992. As a consequence, I was an eyewitness to many of the events described in this book. The different vantage points I can offer, from inside the Vienna of the 1930s and 1940s, from the inner circle of the “Lorenz School,” and from the position of teacher in the United States, may enrich Burkhardt’s view of ethology’s ecologies.

For me, the greatest disappointment of this book was that it said little about the history of ethology’s epistemology. The central concepts of ethology are presented at face value, as introduced by Lorenz and Tinbergen, starting with Lorenz’s 1935 “companion paper” and—more or less—ending with Tinbergen’s *The Study of Instinct* (1951). There is not much about the precursors in physiology and very little about their present-day successors. To me, the central issue of ethology—its epistemology—is the transformation of the archaic concepts of “instinct” and “learning” into entities that fit into our contemporary views of natural science. In this regard, Lorenz’s two “instinct papers” (1937a, 1937b), with their suggestion to focus on the individual organism’s “patterns of behavior,” mark the epistemological turning point. Tinbergen’s *Study of Instinct* was hailed as a textbook, but the young scientists around Lorenz found the title outrageous, because it gave renewed credence and prestige to the old-fashioned, useless term *instinct*.

Similarly, Burkhardt does not discuss Lorenz’s proposal to deal with the various forms of experience (habituation, conditioned reflex, imprinting, etc.) that modify the individual developing, growing organism and to move away from the Watsonian behavioristic concept of “learning” as a do-it-all magical concept. He sees Schneirla and Lehrman and their epigenetic approach as the main opponents of “classical ethology,” whereas to my recollection, behaviorism and Sherringtonian reflexology remained the main intellectual stronghold ethology tried

to conquer. Behaviorism was the attempt to comprehend the behavior of organisms as a matter of stimulus and response. With its well-known creed, "Everything we have been in the habit of calling an 'instinct' today is a result largely of training—belongs to man's learned behavior," behaviorism was the dominant paradigm of American psychology in the 20th century.

Finally, I have to say something in defense of Konrad Lorenz as the person I saw in many situations, within different "ecologies," over many years not only as a teacher and orator, but also as member of his family, as a trusted friend of Tinbergen, as a peer among peers, and as chief of his staff. I saw him interacting with colleagues and plain people: discussing with Otto Hahn subjects such as nuclear power, Hiroshima, and the humanitarian responsibility of the scientist, and planning fish tanks with Hermann Jakobs, the master of our Seewiesen blacksmith shop. Given this personal experience, I am awed, and often in despair, when I am confronted with the considered opinions of people like Burkhardt. To me, their opinions of Lorenz's views and actions before, during, and following World War II are heavily overshadowed by their concepts of "Austria under the Nazis," by their concepts of Konrad Lorenz's "ecologies" in Vienna during these times, and by their concepts of my own "ecologies" and those of our families and friends.

There is another rich public record that is utterly ignored as character witness—or disparaged as "just so stories": Lorenz's popular books, and his exemplary standard of animal care, as well as his specific political style in his last engagement in environmental affairs in Austria. Lorenz's "stories" in *King Solomon's Ring* (1952) and *Man Meets Dog* (1954) reveal great warmth and compassion for all creatures and truly Solomon-like wisdom regarding our coexistence with nature. His attention to animal welfare in his department in Seewiesen set new standards, far ahead of what is still tolerated today in business, science, and zoos. I do not remember a single case in which he sacrificed an animal just to satisfy his curiosity, or to increase his sample size to attain a still questionable "statistical significance."

As for Lorenz's political engagement, whatever he had done during World War II is surpassed by his challenging, head on, two chancellors of the Austrian government: Bruno Kreisky (1978) in matters of nuclear power and Fred Sino-watz (1984) in preventing bloodshed in the struggle between environmentalists and police, an engagement that saved the last stretch of his beloved Danube river from economic degradation.

I never saw Lorenz acting as a relentless opportunist, obsessed by pursuing his academic career, as Burkhardt and especially others have constructed from their sources, based on a few of Lorenz's remarks in private letters and in four papers. Konrad Lorenz was at heart a curious, playful, and highly gifted enfant terrible, well restrained by good manners and an eagerness to live up to the high standards of his successful father. He never lost that childlike curiosity and playfulness even after achieving success and world acclaim. He owed this success not

only to his genius and his new insights, but also to his wife Gretl, the great woman who stood behind this great man.

I leave the last words to the doyen of German biology for the second half of the 20th century, Hansjochem Autrum, fellow recipient of the highest German award for humane distinction, the *Pour le Mérite für Wissenschaften und Künste*: “The really great Scientist excels not only by his new insights, but also by his humane stature. He can learn and he is humorous. All these traits, combined with untiring vitality, that was Konrad Lorenz.”

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