

The Dancing Bees:

Karl von Frisch, the Honeybee Dance Language, and
the Sciences of Communication

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In January of 1946, while much of Europe lay buried under the rubble of World War Two, the bee researcher Karl von Frisch penned a breathless letter from his country home in lower Austria. He reported to a fellow animal behaviorist his “sensational findings about the language of the bees.”¹ Over the previous summer, he had discovered that the bees communicate to their hive mates the distance and direction of food sources by means of the “dances” they run upon returning from foraging flights. The straight part of the figure-eight-shaped waggle dance makes the same angle with the vertical axis of the hive as the bee’s flight line from the hive made with the sun during her outgoing flight. Moreover, he found that the frequency of individual turns correlated closely with the distance of the food; the closer the supply, the more rapidly the bee dances.

Von Frisch’s assessment in the letter to his colleague would prove correct – news of the discovery was received as a sensation and quickly spread throughout Europe and abroad. In 1973, von Frisch was awarded the Nobel Prize in Physiology or Medicine together with the fellow animal behaviorists Konrad Lorenz and Niko Tinbergen. The Prize bestowed public recognition that non-human animals possess a symbolic means of communication.

Dancing Bees is a dual intellectual biography – about the life and work of the experimental physiologist Karl von Frisch on the one hand and the honeybees as cultural, experimental, and especially communicating animals on the other. Von Frisch was born in 1886 into the cradle of the Viennese

¹ Karl von Frisch to Otto Koehler, January 12, 1946, Nachlaß Karl von Frisch, Bayerische Staatsbibliothek, Munich, ANA 540 Bl.

bourgeoisie. He trained with his uncle, the renowned physiologist Sigmund Exner and later with Richard Hertwig in Munich, whose institute he would direct after the latter's retirement. Von Frisch's work was underwritten by detailed investigations into the sensory capacities of animals, especially fish and bees. Belying the enthusiastic tone of the above-quoted letter, he performed some of his most important work on the bees under the troubling and often life-threatening circumstances of WWII and the German Reich. Von Frisch was found out to have had a Jewish grandmother and consequently lost his permission to teach at the University of Munich in accordance with the Civil Service Law of 1937. As motions were underway to forbid him from working altogether, friends in high places managed to intervene on his behalf, and government officials finally allowed him to continue his investigations. In the 1940s, bee populations throughout Europe were facing the devastating effects of a bee plague (as they are again today). Because the insects were important pollinators of crops, von Frisch's work was deemed critical to the Reich's food supply by the Ministry of Food and Agriculture. Years later, he recalled that the bees had saved his life.

Well before von Frisch revealed the animals' remarkable ability to communicate, bees had been much-studied and commented upon for their morphology and habits. From Aristotle's observation of their curious movements in the hive, to Bernard Mandeville's early-eighteenth-century, subtly subversive fable of the political maneuverings of the bees, to nineteenth-century German satirist Wilhelm Busch's searing lines about the slothful male drones, the animals provided a ready canvass for moral projections onto nature. But bees were not just objects of scientific inquiry and musings on politics and gender. Indeed, for millennia, human efforts to keep them for their wax and honey production resulted in a rich history of apiculture. The animals could not be kept singly or indoors, which made them uniquely resistant to conventional domestication efforts. These features brought the craft knowledge of the beekeeper indispensably into von Frisch's outdoor laboratory. And even though von Frisch was hailed as one of the most exemplary practitioners of the objective science par excellence – experimental physiology – the honeybees were never independent of the rich cultural and intellectual milieu in which they were kept and studied.

The implications of von Frisch's work were far-reaching. Scholars had long considered language a window into minds and souls and one of the key differences between humans and animals. While Charles Darwin and his followers had labored since the second half of the nineteenth century to dismantle the wall separating animals from humans, behaviorists' demands for objectivity and strictures against anthropomorphism in the name of science constantly reified such boundaries. But in the post-war period, notions of language were about to be fundamentally revised. Born of wartime communications research and the telecommunications industry, the inter-disciplinary science of cybernetics promised to reduce all language to signal, regardless of its sender, transmitter, or recipient (be it human, animal, or machine). The geneticist and evolutionary biologist J.B.S. Haldane and his wife, the mathematician Helen Spurway, studied the bee language as a cybernetic system. Moreover, significant sources of money, such as the Rockefeller and Macy Foundations as well as NASA identified an urgent need to study communication across cultures, species, and even galaxies. Von Frisch received generous funding from the Rockefeller Foundation that allowed him to rebuild his laboratory in Munich and would continue to fund his work there and at his country retreat in Austria. Although we are now tempted to see twentieth-century linguistics as largely a consequence of the linguist Noam Chomsky's revolutionary (and resolutely human-centric) work, there was a brief window during which the dream of universal communication seemed possible, when the bee was not simply a remarkable animal that was highly adapted to its environment, but a key that might unlock the gate that separated animals from humans.

During the 1960s and 1970s, when von Frisch's interpretation of the communicative function of the bee dances came under attack from the American bee researcher Adrian Wenner and his collaborators, scientists of a vast variety of commitments – including the primatologist Stuart Altman, the entomologist and later sociobiologist E.O. Wilson, and the cognitive ethologist Donald Griffin – publicly rallied on behalf of the communicating bees. Von Frisch's work proved a valuable touchstone for the re-establishment of animal-human continuity and an important arrow in the anti-behaviorist's quiver. A promising area of research that focused on communication of primates, dolphins, whales and songbirds emerged. By recovering bees as one of the most studied and significant members of the mid-century pantheon of communicating beasts, the book will complement

recent studies of animal communication, such as Dominique Lestel's work and Gregory Radick's *Simian Tongue*, which focus largely on primate communication.

Dancing Bees will be the first in-depth scholarly treatment of von Frisch's life and work. It draws from extensive published and archival sources, including books, notebooks, articles, and films and aims to contribute to current scholarship in the history of the life sciences, animal studies, and the history of twentieth-century sciences of language. Although his co-Nobel Laureates, Konrad Lorenz and Niko Tinbergen, and the discipline of ethology have received considerably scholarly attention – most recently in Richard Burkhardt's prize-winning monograph – the story of von Frisch and the bees is waiting to be told. This despite the fact that he trained dozens of students over his long career at the University of Munich, Rostock, and Breslau and would prove one of the most important voices on the animal-human boundary of the century.