

Prologue

WHO TAUGHT THE RAVEN IN A DROUGHT TO THROW PEBBLES
INTO A HOLLOW TREE, WHERE SHE ESPIED WATER, THAT THE
WATER MIGHT RISE SO AS SHE COULD COME TO IT?

Francis Bacon
The Advancement of Learning, 1605

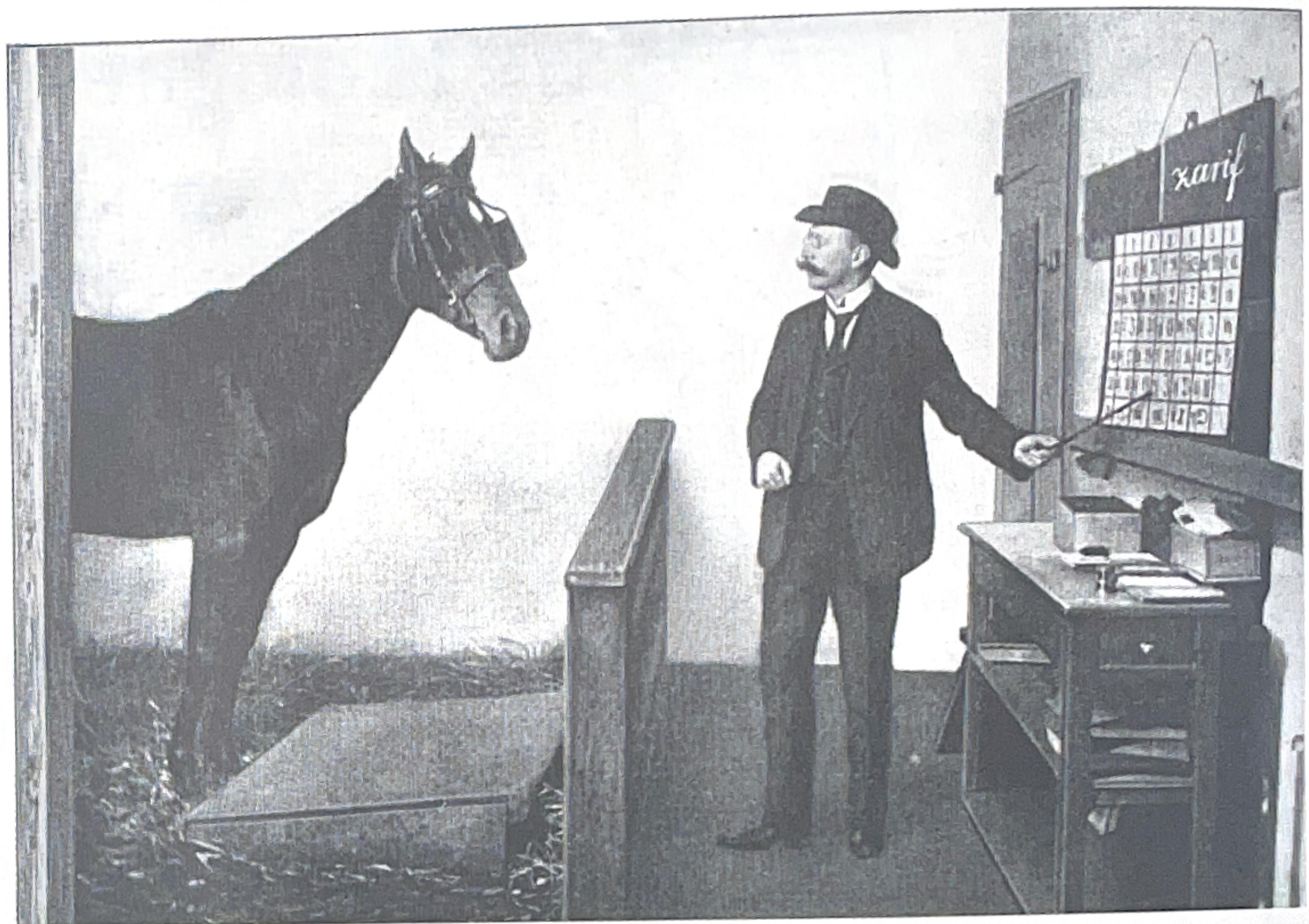
In the early 1900s a retired German mathematics professor discovered that his beloved horse, Hans, was a prodigy. Herr von Osten gave Hans lessons in counting and spelling, exposed him to the concept of color and the basics of musical theory, even presented some simple arithmetic. Hans responded to tests of his knowledge by tapping his foot an appropriate number of times in answer to questions.

Entirely uninterested in showing off his pupil for money, von Osten invited only small and select groups that included many highly skeptical students of behavior to observe Hans (widely known by then as **Clever Hans**). The visitors were encouraged to devise their own tests of Hans's abilities; some examinations were conducted without von Osten's presence, but Hans lost none of his cleverness when his teacher was away. The consensus of the scientific community was that Hans was a genius.

The true nature of Hans's gifts came to light after a long and intensive study by Oskar Pfungst, an experimental psychologist. Pfungst concluded that Hans did not really understand the questions put to him, much less know the answers—the problems could be posed in an unfamiliar language, by whispering them, or even just by thinking them. But if neither questioner nor observers knew the answer, Hans was at a loss to solve even the simplest problem or respond to any of

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The fame of Clever Hans inspired myriad attempts to instruct horses. Here, in 1909, a clone named Larif is taught the alphabet.



the questions he had answered correctly on previous occasions. Unless the horse was telepathic, he was picking up unconscious cues from his questioners.

Pfungst ruled out auditory cues fairly quickly and soon concluded that the cues must be visual. Hans's accuracy fell toward twilight and hit zero if the questioner stood behind an opaque screen and no onlookers were present; even von Osten could not coax the correct answers from Hans in these circumstances. The horse, it turned out, was taking his cues from unconscious, almost imperceptible shifts of head and body posture in the members of the audience—movements created by the involuntary relaxation of the tension among the observers when the number of hoof taps reached the correct value. Pfungst himself, even after he understood the process, found it almost impossible not to cue the horse.

Clever Hans was marvelously perceptive—but not in the way most observers had hoped. The idea of some other intelligence—an animal or extraterrestrial—has appealed to the human mind for millennia. Many of our earliest stories are about animals endowed with reason and human emotions. Dolphins rescue people, eagles bear them over obstacles, apes and wolves nurture lost or abandoned children. Some-

times the earthly and divine powers are mixed: powerful animal gods appear in the early cultures of every continent.

The concept of animal intelligence continues to hold our imagination today, as evidenced by children's stories from Beatrix Potter to television's Lassie, but an increasing tendency in Western thought toward empirical evaluation has encouraged a more scientific consideration of the animal mind. Darwin wrote in *The Descent of Man* (1871) that the difference in mind between humans and the higher animals "certainly is one of degree and not one of kind. We have seen that the senses and intuitions, the various emotions and faculties, such as love, memory, attention, curiosity, imitation, reason, and so on, of which man boasts, may be found in an incipient, or even sometimes in a well-developed condition in lower animals."

Most people, including scientists, probably continued to agree with Darwin, even after the Clever Hans debacle. But von Osten's student, the Piltdown Man of the behavioral sciences, signalled the end of the spirit of open-minded investigation of the animal mind, and skepticism, even denial, became an entrenched tenet of behavioral faith. This reaction is still apparent in the computer analogies that have become indispensable in describing many examples of animal mentality.

Until very recently it has been anathema in the scientific world to suggest in print that intelligence of some sort, perhaps even self-awareness, might guide the routine and often stereotyped behavior of many animals. And field research into the mechanisms of animal behavior has revealed many intricate but innate behavioral programs that, despite their sophistication, have no apparent intellectual component. A question like Bacon's about raven behavior, a behavior recorded by Aesop in the sixth century B.C., now suggests to most researchers not a feather-cloaked hydraulic engineer but an animal responding automatically to an unusual stimulus.

Imagine, then, the reaction when the notably rigorous behavioral scientist Donald Griffin challenged his colleagues to imagine that bees might think and birds engage in conscious deception. In *The Question of Animal Awareness* (1976) he argued that intelligence and an ability to plan are characteristics that would be favored by natural selection as much as any other useful adaptation. Griffin suggested new ways of interpreting behavior that had long been comfortably categorized as innate. Many researchers into animal behavior reacted to these arguments with outraged scorn; most of the rest displayed a polite lack of interest.