

psychokinesis, and explain the possible relation between them.

5. *a.* What factors led reporters to suspect James Herrmann?
b. What explanation is suggested for Dr. Platt's interest in James? What happened during his visit?
6. *a.* List all the explanations given for the disturbances.
b. Which seems to you most reasonable? Least reasonable? Explain.

↔ Words in action

A playwright once created a ridiculous character who confused words that were similar in sound but different in meaning. For example, if she had been talking about the weather at the time of the Herrmanns' problem, she might have said that the relative *humidity*, rather than *humidity*, was 43 per cent.

It is not always easy to distinguish between words which look or sound alike,

for the difference may be very slight.

The exercise below shows how important it is to look at each word carefully. From the pair of words in parentheses, choose the word actually used in the article; then be prepared to give the meaning of both words. Use your dictionary if necessary.

1. Some of the suggestions received by the Herrmanns were from (*obvious, oblivious*) crackpots, but most came from people of good will.
2. One woman advised the Herrmanns to buy a (*patient, patented*) metal cap for their chimney.
3. A man described as a (*physicist, psychiatrist*) blamed the disturbances on underground streams of water.
4. Some people found cases similar to the Herrmanns' in the (*annals, annuals*) of poltergeists.
5. But no one could explain what was (*affecting, effecting*) objects in the Herrmann house.

Clever Hans

by Evon Z. Vogt and Ray Hyman



The following true account shows how a famous mystery of the past was solved because one man used the "scientific method" and refused to believe everything he saw.

In the year 1904, there appeared in Berlin a Russian trotting horse known as Clever Hans.¹ Here was a horse, so it seemed, that could have settled the age-old question of animal consciousness. For Hans was renowned for his ability to solve arithmetical problems, to spell and define words, to identify musical notes and intervals, and to behave in other ways that indicated he had powers of abstract reasoning.

¹Hans (hans).

The public sang his praises in songs, articles, and books. His picture appeared on post cards and liquor labels. Children's toys were made in his image. Men of renown investigated him and found him to be truly endowed with human intelligence. He was intensively studied by a committee consisting of a circus manager, several educators, a zoologist, a veterinarian, a physiologist, and the famous psychologist Carl Stumpf. The committee reported that no trickery or known cues were involved. Hans had achieved the developmental stage of a fourteen-year-old child.

The horse's trainer, Von Osten,² a man of about seventy years of age, stood proudly at the horse's right. A former arithmetic teacher, he had spent three years teaching Hans the three R's. His approach was not that of the circus performer but that of the patient schoolmaster. Instead of the whip, he used occasional rewards of carrots which he kept stuffed into his pockets. He declined to profit commercially from Hans' fame. Even the group that gathered in the courtyard to watch Hans go through his paces came free of charge.

Hans could answer almost any question put to him in German. He could count up to one hundred, and he could do all the basic arithmetical operations, including those involving compound fractions and decimals. He could spell words, identify persons and objects by name, designate the pitch of musical notes, and even express a like or dislike for certain kinds of music. Hans, of

course, could not talk in a vocal sense. He responded to questions by tapping with his hoof, shaking his head, or walking over and pointing to letters on a board or objects on a rack.

Other animals, to be sure, had been advertised as capable of such feats. But these other animals had been trained to respond to cues and signs from their masters.

Furthermore, it developed that Hans could often perform even when his master was not present. In September 1904, after examining Hans thoroughly, a commission of thirteen outstanding scientists and animal experts could only report:

In spite of the most attentive observation, nothing in the way of movements or other forms of expression which might have served as a sign could be discovered. . . . This is a case which appears in principle to differ from any hitherto discovered . . . and therefore it is worthy of a serious and incisive investigation.

It remained for the psychologist Oskar Pfungst³ to carry out this "serious and incisive investigation." The results of Pfungst's systematic inquiry are recorded in his book *Clever Hans*. This amazing document not only presents us with an illustration of scientific investigation at its best but unfolds its findings in the manner of the best detective thrillers.

Mr. Pfungst first took pains to make friends with Hans. Then, when Mr. Von Osten was not present, he put questions to Hans. To the scientist's amazement, the horse answered correctly each prob-

²*Von Osten* (fon os'tan).

³*Pfungst* (pfungst).

lem put to him. Mr. Pfungst knew that he was not coaching or signaling the horse. Yet, with no one else present, the horse was going through his paces with perfect precision.

Some other eminent men had gone through the same experience with Hans. Faced with this unexplainable situation, they honestly admitted their bewilderment and publicly endorsed the claim that Hans was capable of abstract reasoning. Mr. Pfungst was also honest enough to admit his bafflement. But it is at this point that his scientific training distinguished him from the other eminent onlookers. Instead of jumping from his inability to explain the horse's behavior to the conclusion that Hans was quasi-human, Pfungst investigated further.

He designed a series of experiments in which the horse was questioned in the usual fashion. But half of the questions were ones to which the questioner knew the answer and half were ones to which the questioner did not know the answer. The results were clear-cut: Hans could answer questions only when his questioner knew the answer. When his questioner was ignorant, so was Hans. Obviously, then, Hans was getting his cues from the questioner. But what were these cues, and how was Hans receiving them? After eliminating auditory and tactual cues, Pfungst used blinders to block the horse's view of the questioner. Here Hans balked. He insisted on turning his head and orienting himself so that he could see his interrogator. As long as Hans could not see his questioner, he could not answer his question.

So far, two facts had been established. Hans could answer questions only when the questioner knew the answer, and he had to see the questioner to give him the answer. But here the investigation met a snag. It appeared that the horse was responding to visual cues, and Pfungst, to whom the horse responded perfectly, was unable to detect any behavior or postures in himself that could serve as a sign.

Again, Pfungst revealed the ideal of scientific spirit. He did not give up. He kept looking and finally discovered the answer where all others had failed. The horse was responding to a postural cue from the questioner, a cue so small and subtle that it was almost impossible to detect.

When the questioner asked his question, he focused attention upon the horse's hoof, which began tapping the answer. In many questioners, this close attention produced a tenseness that was translated into an almost imperceptible slouching of the head⁴—just a trace of the more overt gesture⁵ of bending over and watching the hoof. This was a sufficient cue for Hans to begin tapping. When Hans had tapped a sufficient number of times in response to the question, the questioner, confident that the horse was not going to tap any more, would

⁴In many questioners . . . head. You have probably had the experience, during a tense moment in a movie, of concentrating so hard that, upon relaxing, you discovered you had been leaning forward without knowing it. Professor Pfungst found this same kind of muscular reaction on a very small scale in his questioners.

⁵More overt gesture, plainer, more obvious movement.

almost imperceptibly raise his head and straighten up. This was Hans' cue to stop tapping.

Pfungst had been unable to discover this cue by studying himself. It was only after long observation of other questioners that he discovered it. Pfungst did not stop his investigations at this point. Instead, he carried his investigations into the laboratory. He wanted to know if naïve questioners would unintentionally give the same cues that the successful questioners had given to Hans.

For these experiments, Pfungst played the part of Hans. His right hand became the right foreleg of Hans. A questioner would stand before Pfungst. He would merely think of a question that could be answered in terms of a number of taps of

the hand. Pfungst would look for the cue, the almost imperceptible slouch, to begin tapping. He would tap, all the while observing the questioner; when he thought he observed a slight relaxation in the questioner, he would cease tapping.

In all, Pfungst went through these paces with twenty-five different persons who ranged in age from five upward. None of these subjects was aware of the purpose of the experiment. The results were startling. All but two of the subjects gave the same involuntary head movements that Pfungst had discovered in the questioners of Hans. And Pfungst was able to use these involuntary movements to successfully "read" the minds of his questioners. He was able to devise other kinds of experiments to correspond with



Hans' complete repertoire. In each case, the subjects gave involuntary cues; and in each case, when being told, they denied any knowledge of these involuntary movements.

And still Pfungst wasn't satisfied. He carried on with further experiments. He found that he could train a subject to give him cues of various kinds, even while the subject did not know he was being trained to give such cues. He then built special apparatus to record such movements objectively.

The results of all these experiments were undeniably clear. When subjects asked a question and then concentrated on the movements of the experimenter, they invariably made involuntary movements which cued the experimenter when to start and stop. And the experimenter had little trouble in utilizing these cues to read the minds of the questioners in a manner similar to that of Hans.

One question remained to be answered. How did Hans learn to respond to these cues? Did his owner, Mr. Von Osten, deliberately train him to react to these cues? Or did he accidentally pick them up by the simple process of noting that he was rewarded with a carrot if he stopped at certain signs? All the facts lead to the conclusion that Mr. Von Osten was as much the dupe of his involuntary actions as were all the later investigators.

Von Osten spent three years patiently training his horse. Others who came after him, knowing the real secret of Hans' success, succeeded in teaching other horses Hans' complete repertoire in a matter of weeks.



Talking it over

1. In what important way did Hans differ from other animals that were advertised as being able to count, spell, and do other mental tricks?

2. List Professor Pfungst's most important discoveries and conclusions as they occurred in the course of his investigation.



Words in action

"Professor Pfungst found that Hans did not respond to auditory cues." In this sentence, unless you understand the meaning of *auditory*, you really don't know what the sentence means. What are some other words beginning with *audi* that you do know? What about *audience*—a group of people gathered in a place to *hear* something? Or *auditorium*—a building where people come to *hear* lectures, concerts, or other performances? Is an *audible* whisper a soft whisper or one that is loud enough to be *overheard*?

Can we conclude, then, that words which begin with *audi* may quite possibly have something to do with *hearing*? Now reread the sentence above. What kind of cues do you think auditory cues are?

If the school nurse came into the building carrying a machine labeled *audiometer*, what part of the body would she probably be planning to check? What connection with hearing do the italicized words in the following sentences have?

1. He was not a regular student; he was only an *auditor*.
2. We have to be present in the studio for an *audition*.
3. Although the patient was very weak, he spoke *audibly*.