

PSYCHOLOGY

# Creating "Language" For Chimpanzees

## These Apes Learned to Use Play Money Not Only For Buying Food But Also to Express Abstract Ideas

By MARJORIE VAN DE WATER

**A**N APE cannot go into the Willard Hotel or the Waldorf-Astoria, read the menu and write his order for a meal. But he can choose the delicacies he wants from the machines in an Automat. Although he cannot speak to tell of his desires, he can express them in this way. And he would buy himself a good meal, too.

Chimpanzees have performed exactly that feat at the Laboratories of Comparative Psychology at Yale University.

Poker chips of various sizes and colors were used for money. And the slot machines, aptly called by the investigators "chimpomats," were especially devised for the experiment. Different chimpomats were used to vend different kinds of food. A white chip would "buy" grapes; a red one bananas; a green one, oranges, etc. An animal, then, in order to obtain a particular food simply had to select the appropriate chip and insert it into the slot of the chimpomat.

The ability to appreciate the value of money as a symbol for what it can buy has heretofore been considered an exclusive attribute of man. These experiments at Yale demonstrate, however, that animals lower in the scale than man can attach a significance to symbols. This is the conclusion of Dr. John B. Wolfe, National Research Council Fellow who conducted the experiment under the direction of Dr. Robert M. Yerkes.

Apes can use "money" to buy the banana or other treat they desire. They can select water-buying tokens when they are thirsty. They can choose a small white token rather than a larger one with smaller purchasing power. They can discard as worthless, brass checks which were the "plug nickels" of the experiment and had no exchange value. They can even "hoard" more of the tokens than they can spend at one time, holding them for future use if not for a rainy day.

It was not an easy task for the apes to do all this, however. The first act was to reach for the food at the open-

ing, and this first step was not so difficult. Even a dull chimpanzee can easily learn where to find a banana. Very soon they came to associate the appearance of the food at the opening with the insertion of the coin by the experimenter, so that as soon as Dr. Wolfe would start to put the tokens into the slot the chimpanzee was ready and waiting to catch the forthcoming banana.

The next step for the animal was to insert the chip itself. But for some reason this was much more difficult. Finally two animals mastered the trick, and then they proved themselves better teachers than the psychologist was. Dr. Wolfe allowed the other two to learn from the experienced apes, and they picked it up much more readily from their ape-instructors.

Other machines were introduced, and other "coins." The chimpanzees had to learn that the white chip would work in one machine but not in another. And they had to learn that one machine would deliver a banana and nothing else, while another would deliver nuts or some other food.

### Like the Automat

The problem was quite like that of the diner in the automat restaurant who must learn to go to one machine and insert a nickel for coffee and to another and insert a dime for pie. You can't get coffee from the pie machine by putting in a nickel, nor pie from the coffee machine by inserting the dime.

Mr. Chimp, finding his wealth spread out on the floor, would pick the correct coin, go unhesitatingly to the corresponding chimpomat, and buy what he wanted.

Having demonstrated that the ape has the ability to spend money, Dr. Wolfe began to wonder whether or not he would work for "wages." Could an ape show sufficient foresight to work when the only reward was an inedible chip that he could later spend for food? To a man, the green bills in his pay envelope are a sufficient incentive for his labor; he doesn't have to see before him his reward in food or other desirables. In fact, money has come to mean

more to man than the articles it will buy, so that some individuals enjoy the accumulation of money for its own sake. To a very young child, however, a delicious candy or a ride on the merry-go-round forms a much more powerful incentive than the brightest of bright pennies.

Could the ape be taught to work as hard for the "penny" as for the banana it would buy?

This was tested by means of an ingenious work machine. The reward—banana or token—was placed on a bar outside the cage of the ape. It was arranged so that the ape could lift the bar, pulling the reward up to a distance within his grasp. Then weights were placed on the bar so that it became a real task to lift the reward up to the place where it could be secured by the ape. As additional weights were added the work became increasingly harder, and the total weight which the ape was willing to lift became an accurate measure of his desire for that particular reward.

Provided the token on the bar was one which the chimpanzee recognized as a good one—one which would buy the reward he wanted—he would work just as hard to get hold of it as he would for the banana or other tid-bit itself. But if a worthless check were placed there, the chimp was no longer interested in the task.

The animal was allowed to go to the chimpomat immediately after he got the money and spend it. But later research may be undertaken to find out whether he can be taught to work today for money that he is not allowed to spend until tomorrow—or next Saturday night.

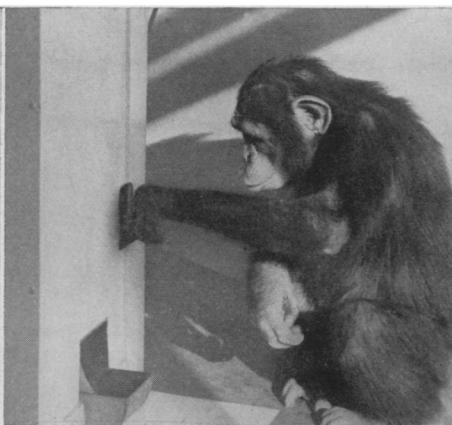
### Substitute for Language

Watching the apes expressing their desire for food by going to the machine of their preference and buying it, Dr. Wolfe was struck with the possibility that these tokens and slot machines might become a substitute for language for the apes.

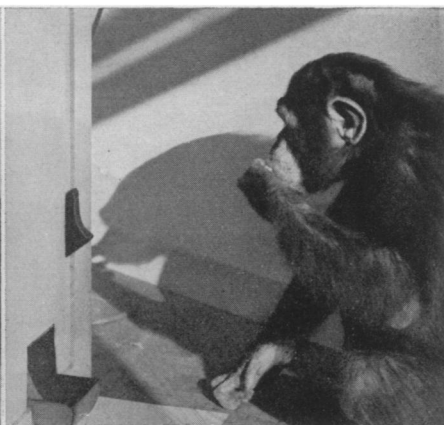
The author of the Tarzan stories is not the only one who has speculated about the language facilities of these manlike creatures. But despite persistent tests and experiments, there is still no scientific evidence that chimpanzees can learn to speak the language of man



CHOOSING THE COIN



DROPPING IT IN SLOT



EATING HIS PURCHASE

or that man can learn the language of apes, if indeed they have one.

Dr. Robert M. Yerkes, under whose direction Dr. Wolfe has worked, and who is an authority on the intelligence and habits of apes, has himself conducted exhaustive experiments on this point. He found nothing to make him think that the ape has what can be correctly called a language. True, he has calls, and makes a variety of definite sounds, but these are more truly expressions of emotion than of ideas. They are more like man's sighs, or groans, or squeals, than like his words.

All attempts to teach the ape to speak human words have failed, and this failure is in spite of the fact that apes are exceptionally clever at learning to understand what is said to them.

The reason for their apparent inability to speak is due, Dr. Yerkes believes, to a lack of inclination to imitate sounds. The human child, and the parrot in lesser degree, have a natural tendency to copy the sounds they hear. If you say "boo" to a baby, you will soon hear him repeat it after you. The ape will not imitate in this way. He "apes" what he sees; not what he hears. Without this tendency to mimic sounds, the learning of speech is out of the question, even though he has a vocal mechanism that would make speech perfectly possible so far as the psychological equipment is concerned.

#### Has an Ape Ideas?

Other psychologists have suggested that the ape does not speak because he hasn't the ideas to express. Dr. Wolfe, in considering this theory, allowed the chimpanzee to use the token-technique as a substitute for language. A yellow chip placed in one chimpomat was to indicate that the ape wanted to play or

romp around with the examiner. A blue chip placed in another machine would indicate his desire to quit the experiments and return to his living quarters.

The apes learned this more "abstract" use of the machine quite as readily as they learned to get food from the chimpomats. In fact, Dr. Wolfe reports that the use of the blue chip was learned with greater ease than any of the others.

#### Expresses Dislike

During the course of the experiment, Dr. Wolfe brought in a professional camera man to photograph the animals. One creature took an instant dislike to the stranger. She became so excited that it was difficult to persuade her to do anything that could be used for the picture. Finally Dr. Wolfe spread out on the floor all the various chips that were familiar to the animals. The chimp was allowed her choice.

There was not the slightest hesitation. Instantly she grabbed the blue chip and ran to place it in the proper machine, hustling then to the door to get away from that photographer! She was rewarded. Dr. Wolfe took her at once to her home.

Dr. Wolfe believes that it is perfectly possible for the apes to learn to make change. For example, they might place a white chip in a machine which would deliver not food but two red chips, or a blue chip or perhaps a blue chip and a yellow chip.

In this way it may be possible to learn something of an ape's sense of relative values. A banana is worth more to him than a nut, but would he spend his banana chip in order to secure two nut chips, or three, or five, or a dozen? Or would he exchange it for the blue chip that would give him escape from

someone disliked as was the photographer? Or for another that would buy him agreeable companionship with a fellow ape?

These are some of the possibilities that may be explored by further research.

It is also planned to use the same method to discover more concerning the ape's economic attitudes toward his fellows. Will one animal try to secure, by bargaining or by force, the chips earned by another? Will accumulated "money" come to represent power or prestige in the ape community? Will apes learn to hoard, or will they keep their money in circulation?

These are somewhat fanciful questions, but they are questions that it may be possible to answer by this technique, and the answers may show that a great many of the habits of man that we have come to consider a result of the influences of man's civilization are in reality much more fundamental and are shared by him with his ape cousins.

#### Won't "Play the Machine"

One rather unexpected result of the experiment, and an interesting commentary on the intelligence of apes as compared with that of man, was that the apes never "played the machine" just for the entertainment or pleasure of seeing them work. The ape wants real value for his money.

The chimpanzee, the type of ape used in these experiments, has long been believed to be the most intelligent animal lower than man. And the gap between man and the chimpanzee is shown by these and other experiments to be not nearly so wide as was once supposed.

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