but if learning occurs in one trial, we can never obtain a "before-learning" average. Sakai and Miyashita (1991) therefore used a different method to see whether visual learning modified neural circuits. They recorded the responses of single neurons in the inferior temporal cortex to pairs of visual stimuli. The stimuli were generated by a computer, and the pairs were made randomly. As you can see in Figure 14.9, the members of the pairs do not particularly resemble each other. (See ***Figure 14.9.***)

The task went like this: The monkeys were briefly shown one member of the pair. Then after a delay period of 4 seconds, they were shown two stimuli: the other member of the pair and a stimulus from another pair. If the animal touched the correct stimulus, it received a sip of fruit juice. After the training the investigators found neurons in the inferior temporal cortex that responded selectively to some, but not all, of the stimuli. And if a neuron responded to one member of a pair, it was likely to respond to the other member, too. For example, the neuron whose activity is shown in Figure 14.10 responded to only two stimuli: 12 and 12^1. If a particular neuron responds to only two of twenty-four

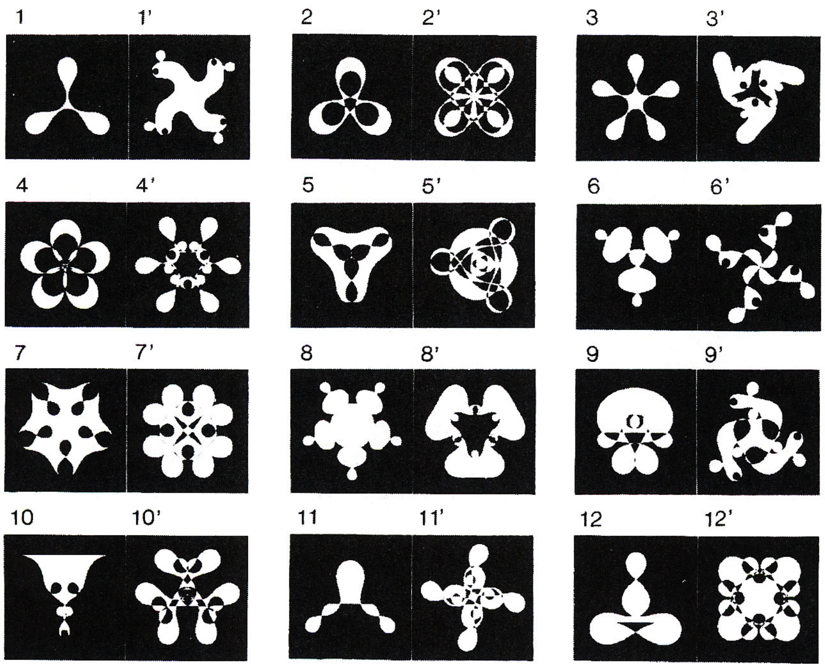

FIGURE 14.9

The twelve pairs of stimuli used in the experiment by Sakai and Miyashita (1991).

(From Sakai, K., and Miyashita, Y. *Nature,* 1991, *354,* 152–155. Reprinted with permission.)

different stimuli, the likelihood of these two stimuli being members of the same pair is only one in twenty-three. (See ***Figure 14.10.***)

Sakai and Miyashita observed another interesting result. Like Fuster and Jervey, they found that many neurons continued to respond during the delay interval, as if the neuron were part of a circuit that "remembered" the sample stimulus. And the presentation of *either* stimulus could activate this circuit—even in cases in which a particular neuron responded to only one of the two members of a pair. The results suggest that when stimuli are paired, the neural circuits responsible for recognizing them become linked together; perception of either stimulus activates both circuits. Presumably, the same thing happens when familiar stimuli undergo changes—as when your friend gets a new hairstyle.

As we saw in Chapter 6, some neurons in the inferior temporal cortex show remarkable specificity in their response characteristics, which suggests that they are part of circuits that detect the presence of specific stimuli. For example, neurons located near the superior temporal sulcus become active when the animal is shown pictures of faces. Baylis, Rolls, and Leonard (1985) found that most of these neurons are sensitive to *particular* faces. Rolls and Baylis

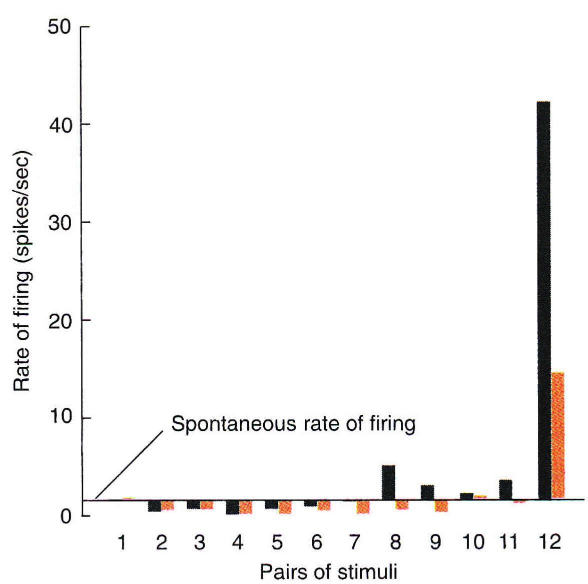

FIGURE 14.10

The responses of a single neuron in the inferior temporal cortex to each member of the twelve pairs of stimuli shown in Figure 14.9.

(Adapted from Sakai, K., and Miyashita, Y. *Nature,* 1991, *354,* 152–155.)