When a person sees an object or image, their brain automatically places it in appropriate categories: Cat or dog. Soft or hard. Red or blue. Such categories are arbitrary and flexible, and the ability to sort things in this way is considered to be a key characteristic of higher brain function. The way that the brain does this, however, has been a mystery.

Freedman has been working to determine how the brain learns and recognizes visual categories by studying the activity of neural circuits during categorization tasks. As a graduate student and postdoctoral researcher at MIT and Harvard, he trained subjects to assign visual shapes and moving patterns to specific categories and showed that the activity of individual neurons in the brain, particularly in the frontal and parietal lobes, can represent or encode the category of those images due to learning. In his own laboratory at the University of Chicago, Freedman has gone on to make many discoveries about how parietal, temporal, and frontal lobe neurons learn and represent both visual shape and spatial categories. And he has shown that while some neurons have very different responses to similar stimuli that can be placed in separate categories, other neurons show gradations of activity that track the perceptual appearance of stimuli independent of their category membership. Such work is not only providing insight into visual recognition, decision making, and memory but may also help people with diseases that may impair these functions, such as Alzheimer's disease, attention deficit disorder, schizophrenia, and stroke.