Bat brains help tell us how processing works in our own

When you’re driving a car, you pass by people, places, colors and shapes. Suddenly, you see one particular combination of color, shape, placement and words. Out of all of the mind-boggling complexity going by, your brain picked out a stop sign in the distance. Soon, you stop the car.

Our brains pick a single object to pay attention to by bringing together many different stimuli. Individual groups of sensory neurons respond to specific features of an object. One group of cells might respond to red. Another might respond to the shape of the sign. Those populations come together at the same time to produce a signal that we pay attention to, disregarding the other objects nearby. This idea is called the temporal binding hypothesis, which posits that the “glue” that makes these signals come together is time. Groups of neurons that fire at the same time link the signals they represent together into a whole picture, the picture of a stop sign.

But it’s not yet proven that this is how our brains pay attention to objects. James Simmons, a neuroscientist at Brown University in Providence, R.I., believes he has the perfect model to study the temporal binding hypothesis: the big brown bat. He published a review on the subject August 15 in the *Journal of Experimental Biology*.

These small evening hunters operate in crowded scenes, with bugs, branches, leaves and other bats and birds in sensory profusion. And bats do this without sight, relying instead on echolocation. To echolocate, a big brown bat emits two pitches at the same time, a high and a low frequency pitch. The pitches bounce off objects in the immediate area, such as a tasty bug, and echo back to the bat’s ears. The echoes of these harmonic pitch pairs activate specific neurons in the bat’s brain.

This system makes bats especially ideal for investigating how time might bind together brain signals. “Each of the many, many neurons in the bat’s hearing system responses to each broadcast and to each echo with just a single response event — a single signal spike,” Simmons says. Because the system is so specific, disrupting the spikes could prove whether or not the temporal binding hypothesis is an accurate description of attention.

Read the full, original story: To study attention, pay attention to bats