Squirrels
That Chunk
Smart cookies remember their buried treasure

By Steve Mirsky

Faculty members of the University of California, Berkeley, have received 22 Nobel Prizes. But some of the most impressive displays of intelligence in recent years on the Berkeley campus have been made by squirrels.

“I dedicated seven years of my life to squirrels,” said the also cerebral Mikel Delgado when I spoke to her in September, the month after she’d completed her doctorate at Berkeley. (She’s now a postdoc at the University of California, Davis.) She and her mentor Lucia Jacobs had just published their most recent study on cognition in the furry acrobats in the journal *Royal Society Open Science.* They wanted to know how fox squirrels keep track of their nuts.

“Fox squirrels are obligate scatter hoarders,” Delgado explained by phone. “And that means they store every nut in a different location. So my research has been focused on the cognitive strategies that they might be using to help them find their nuts later.” After all, squirrels can’t use direct-mailing lists to keep track of the nuts that sustain them the way that, say, vein-popping conspiracy-purveying radio hosts can.

But back to intelligent beings. Delgado and Jacobs thought that the squirrels—just one of which can bury up to 10,000 nuts annually, many of which they do go back and find—might be using a cognitive strategy known as chunking.

“I think about chunking as any shortcutting strategy or mnemonic device that would allow an animal, be it human or otherwise, to increase its memory capacity and improve recall,” Delgado said. Perhaps the best-known example of human chunking is how we remember telephone numbers: the three-digit area code, three-digit exchange (the ubiquitous movie 555) and four-digit line number. With just three items, instead of 10, to remember, you can use your brain’s express lane. “In this study, I wanted to know if squirrels would basically arrange their nuts in a way making it more convenient for them to remember where nuts were stored.”

The researchers recruited 45 campus squirrels for this investigation. Although informed consent was not formally acquired, the subjects were compensated with almonds, hazelnuts, pecans and walnuts, all in shells. Which, conveniently, was also the necessary first step in tracking what they then did with the booty.

In one version of the trial, a human gave a squirrel an almond, for example, after which other humans tracked the squirrel to record where it buried said comestible. The squirrel was then coaxed back to the nut dispenser (playing the role of a high-quality tree), who handed out another almond. After acquiring four almonds, the squirrel would get four of another nut type. This setup was called the clustered condition. That’s right: nut clusters.

Delgado referred to the second variation as the random, or “confuse a squirrel,” condition. The squirrels, unlike congressional districts, never got two in a row of the same kind of nut.

Two other trials had the squirrel nut schleppers get four consecutive or random-order nuts, but wherever a squirrel performed its burial rights was where it received its next payout.

And regardless of the order of the nuts (also the rumored name of a new alt-right honor society), when squirrels got their supplies from the central location, they did indeed spatially chunk. Squirrels can evaluate nuts for weight and quality, and they thus buried all the nutritionally rich walnuts near one another, all the lesser-value almonds near one another, and so on. But when they got a nut where they’d just buried one, they didn’t chunk. “In a very wooded area,” Delgado said, “you have many choices about where to forage, and so there would be times where it would be more efficient for squirrels to search closer to where they currently were.” Or they may have hit their cognitive limit, although this study didn’t tackle that issue, and squirrels I consulted had no comment.

Delgado’s finding adds to the literature of animal intelligence—and to her appreciation of squirrels. “For a lot of people, they’re really one of the few interactions we have with animals. And so I think they’re a really good gateway animal to get people interested in animal behavior,” she said. “Squirrels are busy at work right under your nose, and they’re doing really cool things.”

Of course, any perspicacious viewer of *Rocky and Bullwinkle* knew that the squirrel was the brains of the outfit.