

## A FUTURE REMINDER

### Reshaping the Past

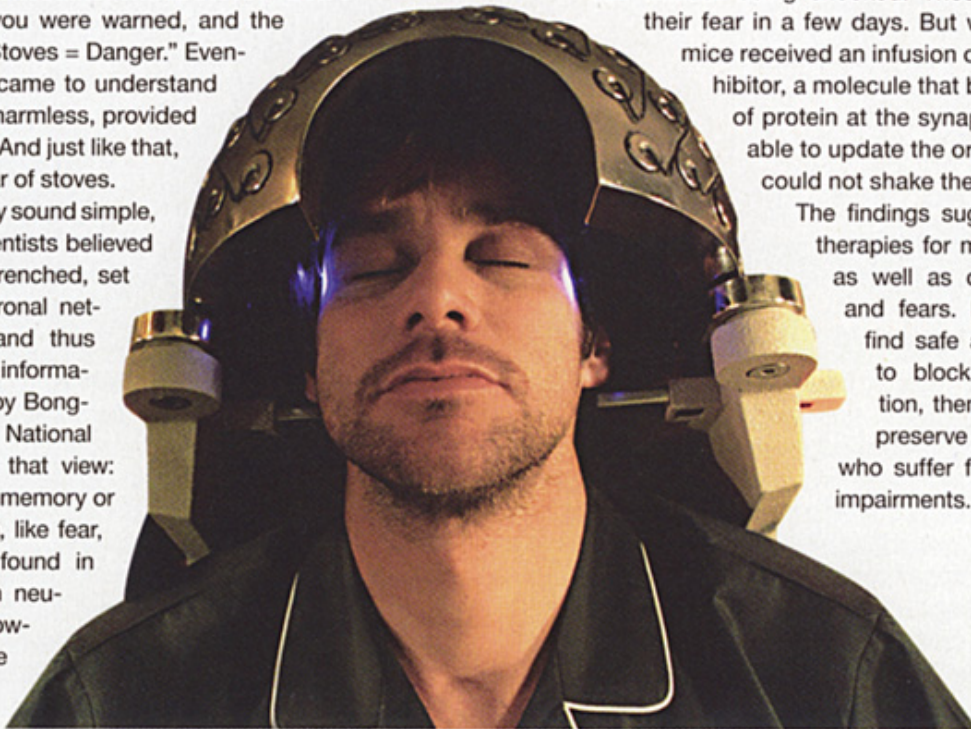
**Remember your first encounter with a stove?** “Don’t touch that! It’s hot,” you were warned, and the message was clear: “Stoves = Danger.” Eventually, of course, you came to understand that stoves are pretty harmless, provided you avoid the burners. And just like that, you unlearned your fear of stoves.

Unlearning a fear may sound simple, but for years neuroscientists believed such emotion was entrenched, set in stone by fixed neuronal networks in the brain, and thus unaffected by new information. Now a study led by Bong-Kiun Kaang at Seoul National University has altered that view: Every time a long-term memory or an associated emotion, like fear, is retrieved, proteins found in the synapses between neurons are degraded, allowing that memory to be updated by incoming information.

To demonstrate how the fear-altering process works, Kaang and his colleagues put mice into a box with a wire mesh bottom and shocked them for one second, teaching them to fear the box.

Subsequently, the mice were repeatedly returned to the same box without being shocked. Those mice unlearned their fear in a few days. But when the returning mice received an infusion of a proteasome inhibitor, a molecule that blocks degradation of protein at the synapse, they were unable to update the original memory and could not shake their fear of the box.

The findings suggest a number of therapies for memory impairment as well as outsize obsessions and fears. If researchers can find safe and effective ways to block protein degradation, then they may be able to preserve memory in people who suffer from mild cognitive impairments. **Orli Van Mourik**



Jim Carrey loses unwanted memories in *Eternal Sunshine of the Spotless Mind*.