Medical Xpress

Teaching old birds new tricks: Zebra finches defy age-related learning limits

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Reactivate lost learning abilities: Study shows how old zebra finches can learn new songs again. Credit: MPI for Biological Intelligence / Julia Kuhl

We all know the adage, "You can't teach an old dog new tricks." As we age, our ability to learn new skills, like mastering a foreign language or

picking up a musical instrument, seems to fade. The culprit? A decline in brain plasticity—the brain's capacity to rewire itself and adapt to new challenges.

But what if we could rewind the clock on this age-related decline? A new study led by Daniela Vallentin at the Max Planck Institute for Biological Intelligence and published in *Nature Communications* offers a tantalizing glimpse into this possibility.

The feathered fountain of youth

Vallentin's team focused on zebra finches, songbirds known for their elaborate vocalizations. Like many animals, zebra finches have a critical period for song learning, within their first 90 days of life. After this window closes, their brains become less flexible, and inhibitory neurons put the brakes on further learning.

The researchers wondered if they could they lift this neural blockade and restore the birds' youthful learning ability. Using cutting-edge techniques like optogenetics, they precisely switched off these inhibitory neurons in adult zebra finches.

The results were remarkable. The birds, once thought to be stuck with their existing repertoire, began to add new elements to their songs. "We observed an expansion of the adult animals' vocal repertoire that was previously thought impossible," says Fabian Heim, the study's lead author.

Beyond birdsong: Implications for human aging

This discovery extends far beyond the realm of birdsong. It suggests that the brain's capacity for learning may be far more resilient than

previously thought. Similar learning windows exist in humans, affecting everything from language acquisition to social development.

If scientists can identify and manipulate the mechanisms that control these critical periods, it could open doors to new therapies for neurodegenerative diseases and injuries that impair learning. Imagine a future where the adage about old dogs and new tricks is finally retired.

More information: Fabian Heim et al, Disinhibition enables vocal repertoire expansion after a critical period, *Nature Communications* (2024). DOI: 10.1038/s41467-024-51818-4

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