

# Scientists find more evidence the aging brain is easily distracted

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Canadian researchers have found more evidence that older adults aren't able to filter out distracting information as well as younger adults.

In an interesting twist, this latest discovery was made because of – rather than in spite of –the noisy environment that research participants must tolerate when having their brains scanned inside a donut-shaped magnet known as a functional magnetic resonance imaging (fMRI) scanner. While the powerful technology can yield remarkable computerized images of the brain working to form a new memory, enabling scientists to determine with great precision which brain regions become active and for how long they remain active, the high powered magnet has an inconvenient quirk – it's noisy, especially if you're inside it.

Now scientists with the Rotman Research Institute at Baycrest say that annoying noise is behind their latest discovery of unique brain activity underlying memory encoding failure – that appears to occur only in older brains.

To date, few studies have looked at what's happening in the brains of people who are having difficulty with making a new memory and the underlying neural mechanisms responsible for this break down.

In the Baycrest study, 12 younger adults (average age 26) and 12 older adults (average age 70) took part in a face recognition task that involved having their brains scanned with fMRI while they were shown pictures of faces and later again when trying to recall whether they'd seen each

face before. Researchers found that when younger and older adults had difficulty encoding a new memory (certain face), this was marked by decreased activity in brain regions important for encoding, such as the hippocampus. The researchers weren't surprised by this based on an abundance of scientific evidence indicating the importance of hippocampus for making memories.

But the older brains showed additional increased activation in certain regions during memory encoding failure that was not found in younger brains!

"The older brains showed increased activation in certain regions that normally should be quieter or tuned down," said Dale Stevens, who led the study as a psychology graduate at Baycrest's Rotman Research Institute, with senior scientists Drs. Cheryl Grady and Lynn Hasher, both of whom are distinguished researchers in aging, memory, attention and distraction.

"The auditory cortex and prefrontal cortex, which are associated with external environmental monitoring, were idling too high. The older brains were processing too much irrelevant information from their external environment – basically the scanner noise," said Dr. Stevens, who is now a post-doctoral fellow in the Department of Psychology and Cognitive Neuroscience at Harvard University. The younger brains did not show this abnormal high idling during their failed memory encoding.

While older adults performed as well as their younger cohorts in the number of faces correctly recognized, the older adults forgot more faces overall than younger adults. The older adults had more "misses", essentially saying "No, I didn't see this face before" for faces that were presented previously. This was likely due in part to their inability to tune out the distracting noise when they were trying to form new memories of faces, said Dr. Stevens.

## How noisy is an fMRI scanner?

The noise sounds similar to a "jack hammer" – loud banging, knocking and buzzing. Research participants are given hearing protection (ear plugs and cushions around the head and ears) to block it out, but older individuals complain more often than younger ones that the noise is irritating.

The fMRI scanner is widely used for studies of the aging brain, but are aging adults at a disadvantage in memory testing because of the noise? It raises a potential confound or source of contamination in data results that all cognitive researchers should be aware of, Drs. Stevens and Grady point out.

"Not only are we reporting new brain evidence of the well known problem of distraction in aging, but we show that the fMRI might inherently make older adults' cognitive performance worse than it would be in the real world, outside the scanner," noted Dr. Grady.

This study is published in the Nov. 26 issue of *The Journal of Neuroscience*.

Source: Baycrest Centre for Geriatric Care

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