

## Computer-Based Brain Training Program

### Research at Washington University

In January 2017, Dr. Piccirillo and other Washington University researchers published results of a clinical trial of a cognitive training program specially designed to exploit neuroplasticity for preservation and expansion of cognitive health in adults with tinnitus. Participants were 40 adults with bothersome tinnitus for more than 6 months and 20 age-matched healthy controls. Of the 40 adults with bothersome tinnitus, 20 were assigned to the cognitive training groups and were required to complete the cognitive training program for 1 hour per day, 5 days per week for 8 weeks. The other 20 adults with bothersome tinnitus did not use the cognitive training program. There was a significant difference between baseline and follow-up in functional connectivity in cognitive control regions of the brain in the cognitive training group but not in healthy controls or untreated tinnitus participants. Of the 20 patients in the cognitive training group, 10 (50%) self-reported improvement attributable to the intervention, and 6 (30%) reported to be much improved in the domains of tinnitus, memory, attention, and concentration.

These findings suggest that the computer-based cognitive training program is associated with self-reported changes in attention, memory, and perception of tinnitus. A possible explanation for these changes could be neuroplastic changes in key brain systems involved in cognitive control. Cognitive training programs might have a role in the future treatment of patients with tinnitus.

Kallogjeri, D.P., J.F.; Spitznagel, E.; Hale, S.; Nicklaus, J.E.; Hardin, F.M.; Shimony, J.S.; Calson, R.S.; Schlaggar, B.L.. Cognitive Training for Adults with Bothersome Tinnitus. A Randomized Clinical Trial. *JAMA Otolaryngol Head Neck Surg.* 2017

### Posit Science BrainHQ

The Posit Science BrainHQ features 29 exercises to improve attention, memory, brain speed, people skills, navigation, and intelligence. Each exercise adapts to your unique performance, so you're always training at the right level for your brain.

To use the Posit Science cognitive training program, please go to:

<http://www.brainhq.com/> and establish an account.

To subscribe \$14 per month or \$8 per month for yearly subscription billed annually at \$96.

Once you have established an account, go to the “Training” landing page.

1. On the Training landing page, tap Explore
2. Tap Courses
3. Find and tap the course labeled Auditory Intensive

This program emulates the Brain Fitness Program (BFP), the legacy auditory training program that has been shown to be very effective in improving memory and processing speed. The course contains six easy-to-use exercises that target various levels of auditory processing: *Memory Grid*, *Sound Sweeps*, *Fine Tuning*, *Syllable Stacks*, *To Do List Training*, and *In the Know*. You may also want to use *Hear, Hear*, which you must add separate from the Auditory Intensive course.

4. Tap the *Start Part 1* button in the right-hand side of the course description.

**The following describes the selected exercises and comes from the BrainHQ website.**

[Memory Grid](#) exercises auditory processing by helping your brain improve its ability to separate individual auditory events. As the brain improves at this skill, it will become better at perceiving and transmitting sound precisely – and at interpreting and recording it accurately. For example, consider the word “bed”. When the brain’s neurons transmit the sounds /b/, /e/, and /d/ to the auditory cortex precisely, the neurons there can assemble and represent the word “bed” accurately. From there, the word can move to the rest of the sensory cortex and eventually the associative cortex, where meaning is assigned to the word based on prior experience—the brain remembers what a “bed” is, and associates it with many different experiences. The more accurately and precisely the sounds for the word “bed” are received and transmitted in the first place, the better able the brain will be able to record it and relate it to other experiences. When the brain makes an attempt to recall the information about that bed later, a crystalline representation will make accessing the information easier. In other words, the brain will be better able to remember the bed.

[Sound Sweeps](#) is an auditory exercise designed to challenge your brain to speed up and sharpen listening accuracy. Only when the brain hears sounds quickly and clearly can it record them accurately. And only when it records them accurately can it recall (remember) them later.

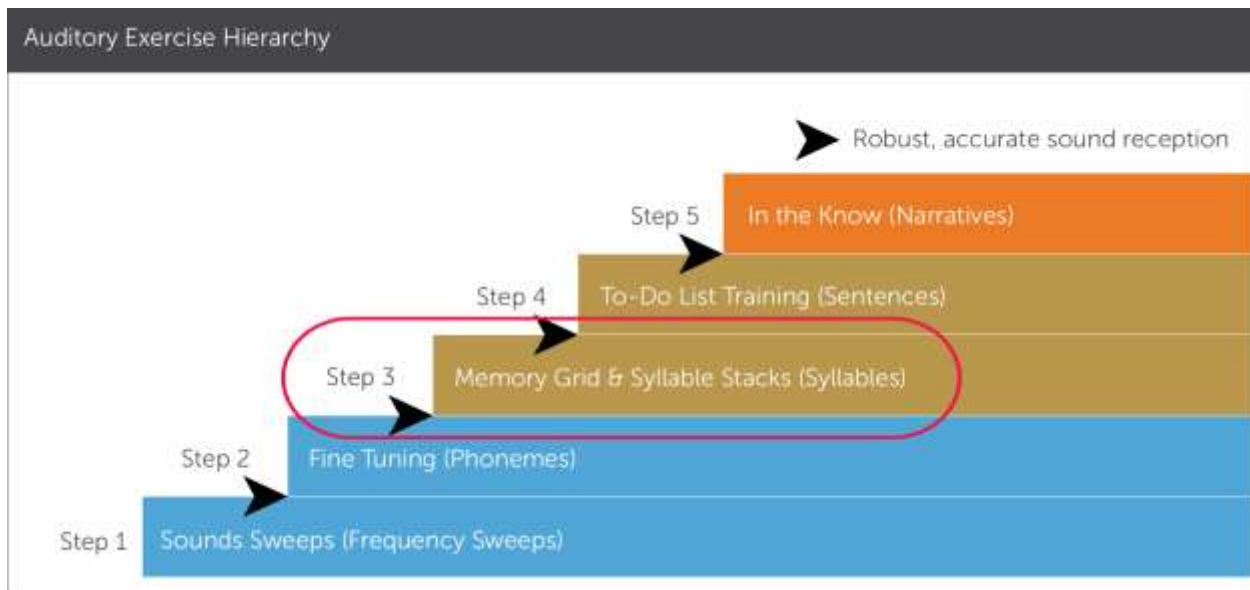
[Fine Tuning](#) is an auditory exercise that practice differentiating two similar syllables that have been stretched and exaggerated, a skill that helps people take in speech more clearly—even when it's quick, indistinct, or muffled. With this exercise, you will be asked to choose between two syllables that sound alike, such as *bo* and *do*. Sounds easy, right? It might not be as easy as you think. These types of syllables are called “confusable pairs.” They contain sounds that are especially hard for our brains to differentiate, especially in harder listening situations, like in a

noisy, crowded room, or when speaking to someone who mumbles, or if someone's talking very quickly.

Many of us get worse at telling confusable pairs apart after age 30 or with certain cognitive problems, because our brains slow just a tiny bit. For accurate hearing, every millisecond counts. When the brain slows even by a fraction, it can muddy sounds together. That's when you find yourself asking someone to repeat what they said. And if a sound isn't recorded clearly in the first place, it's harder to recall it clearly later.

**Syllable Stacks** is a “serial memory-span” exercise. It sharpens working memory by requiring the brain to remember more and more pieces of information, even as those pieces of information get more similar (so easier for your brain to confuse). In Syllable Stacks, you listen to a series of syllables and then repeat them in order.

One more thing about Syllable Stacks: As you may have noticed, the exercise is one of many in BrainHQ that pounds on your brain's auditory processing. We've included [memory exercises](#) that exercise all levels of listening, from the frequency sweeps in [Sound Sweeps](#), to the phonemes in [Fine Tuning](#), to the syllables in Syllable Stacks and Memory Grid, to the sentences in [To-Do List Training](#) and finally the narratives in [In the Know](#). We've done this because for accurate sound reception—which is essential to a strong memory and other cognitive skills—your brain needs to sharpen its neurons from the bottom up. From the “low” level neurons that process frequency sweeps up through the “higher” level neurons that process the meaning of conversations, brain fitness requires that the whole system work as faultlessly as possible!



From Posit Science

To-Do List Training directly engages the working memory processes in the forebrain. The neurons in the forebrain integrate sensory information with information about previous experiences; in other words, they interpret what the brain hears, allowing the brain to remember and use the information for a time.

In the Know exercises your memory for auditory details like these. It builds on other BrainHQ listening exercises such as Memory Grid, Syllable Stacks, and To-Do List Training by extending memory demands to the common, real-world scenario of the complex conversational narrative. The listener must sharply focus on increasingly more difficult and elusive details of longer and longer narratives, and record them accurately in memory across relatively long spans of time.