



Brain Games: Q&A with Walter R. Boot and Arthur F. Kramer

by [Bill Glovin](#)

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Brain games—a billion-dollar industry whose revenues are predicted to surpass \$6 billion by 2020—is the subject of this month’s *Cerebrum* article, “[The Brain Games Conundrum: Does Cognitive Training Really Sharpen the Mind?](#)” We ask a few questions of Walter R. Boot, Ph.D., an associate professor at Florida State University, and Arthur F. Kramer, Ph.D., director of the Beckman Institute for Advanced Science & Technology and the Swanlund Chair and professor of psychology and neuroscience at the University of Illinois.



Walter Boot, Arthur Kramer

Q: It’s clear from your *Cerebrum* article that you both feel brain games are an unproven commodity. Yet, on commercial brain game websites, companies tie the effectiveness of their software to peer-reviewed studies. How can they make these claims?

Walter Boot: When a study appears in a peer-reviewed journal article, it doesn’t necessarily mean that all alternative explanations for brain training effects have been ruled out. Many consumers are not going to look hard enough, or have the background to evaluate whether the evidence they’re seeing on those websites is high quality evidence, or whether the evidence supports benefits to important everyday tasks and not just abstract laboratory tasks.

Arthur Kramer: Some of the research is not specifically for products sold on the website. The studies may be based on relevant and related research, but as we know in our field, there are more than a few failures to replicate studies that have done before. Another problem is that there is seldom a comparison between products, so there is no way for a consumer to know which is the best choice for them.

Q: Your article references ACTIVE (Advanced Cognitive Training for Independent and Vital Elderly), a long-term study that showed some large improvements in cognitive function. Why isn’t this study and studies like it more definitive?

Kramer: The initial training was only 10 hours; training for such a short period in anything does not generally have large and long lasting effects, although there were some multi-year benefits for a subset of the training protocols in the ACTIVE study. In terms of the transfer to real-world tasks and skills, it is often hard to simulate those tasks in a lab so that you have good, objective measures. The ACTIVE study also relied on a lot of positive effects that were subjective and self-reported and some positive effects that were objectively measured, but these were pretty limited.

Q: Can we look forward to one, definitive study that will tell us once-and-for-all whether brain games are effective?

Kramer: It's simply not possible to have a single definitive trial in such a broad field. There are a lot of studies currently under way, including one here at the University of Illinois that will be completed in about a month-and-a-half. We have 500 young and middle-aged adults participating in a multi-modal interventions, which includes physical activity, computer-based adoptive cognitive training and transcranial direct current stimulation. Will it be definitive? Absolutely not! But I hope it will add some useful information to the field.

Q: You are part of an international group of 30 scientists who issued, "The Consensus on the Brain Training Industry From the Scientific Community." Why did you join this group and what are you hoping to accomplish?

Kramer: There are actually 70 people who signed the letter that came out of Stanford [the Center on Longevity] and the Max Planck Institute in Berlin. I had gone to conferences to talk with colleagues about the issues, challenges, and the potential of cognitive training. Based on discussions as well as email conversations and others, we decided the public was not well informed about the state of cognitive training and that the products on the market were far ahead of the research. We came to a consensus, posted it on the Stanford website, and it has been well received across the globe.

Q: With life spans expanding and cognitive function vital to quality of life as people age, has there been enough funding to study the effectiveness of brain games?

Kramer: There is probably never enough funding, but research on different scientific approaches, rather than products, are being funded.

Q: How far away are we from knowing definitively whether brain games are effective?

Boot: Maybe in 10 years we might know enough to make more definitive recommendations. There are a number of exciting things going on right now in psychological science in terms of an increased focus on replication, pre-registration of studies, and better ways to measure and control for placebo effects and other important confounds in brain training studies. There is a movement for a return to methodological rigor and thinking about these issues. Because of this, we are already beginning to see studies with results that are easier to interpret, and I anticipate that this trend will continue.

Kramer: I hope that we will always be developing the science behind the translation and application of the science and continue to learn more about a variety of related things: good nutrition, getting enough sleep, cognitive training, and ways to integrate them all in a seamless way. This will evolve over time. I don't know if we'll ever be able to recommend one particular product over others; that would be remarkable to me. But we will continue to develop ways and approaches to help people function well cognitively so that they can live life to the fullest.

Q: Are there other ways besides brain games to maintain or improve cognitive function?

Boot: We know that physical exercise improves brain structure and brain function. In addition to any mental benefits you get, there are a host of physical and overall health benefits you also get.

Kramer: There are many observational (correlational) studies that show that people who stay intellectually engaged with activities such as books clubs and theater, or who learn to play an instrument or a new language will, as they age, have a higher level of cognitive function than someone who does not engage in cognitively stimulating activities. We don't know a lot about causality, because these tend to be long term—six to eight to ten year—observational studies. But these studies give us good hints about ways to stay as intellectually well-functioning as possible.

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