

Does far transfer exist?

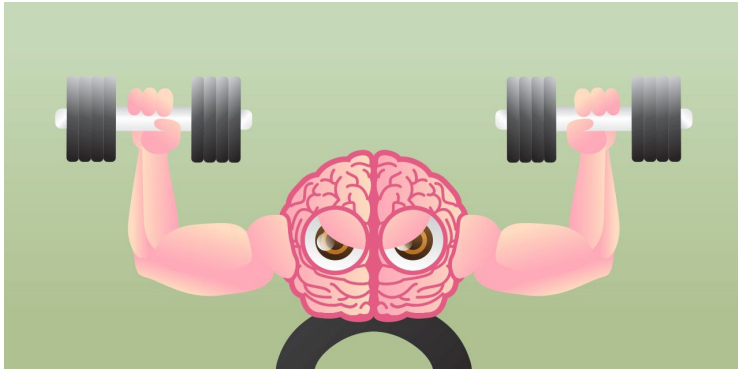
And why does that question matter?

This presentation was given by Dr. Elizabeth Riley in December 2022 at NeuroSalon, an informal gathering of the neuro-curious at Cornell University. The presentation summarized the literature on the concept of “far transfer”. Although these slides do not stand alone and cannot substitute for the full presentation given, which included information not contained on the slides as well as frequent back-and-forth with the audience, they convey the gist of the presentation.

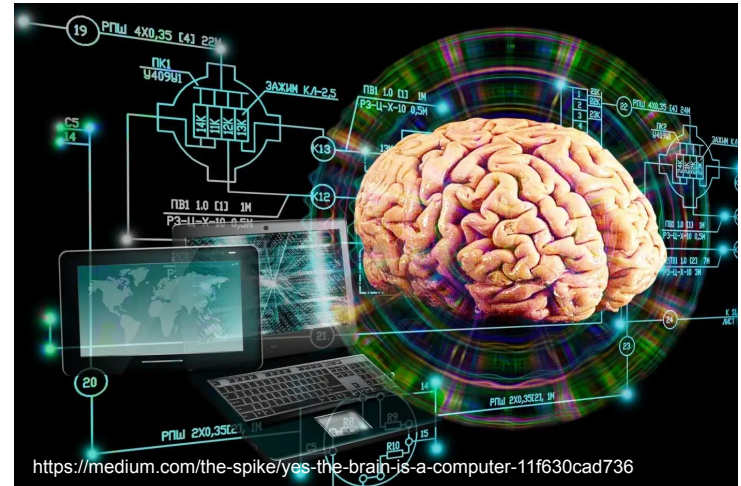
What is far transfer?

“Far transfer occurs when a set of skills generalizes across two (or more) domains that are only loosely related to each other (e.g., mathematics and Latin).” (Sala & Gobet, 2017)

Does it work? Why does this question matter?



Frontiers Kids



<https://medium.com/the-spike/yes-the-brain-is-a-computer-11f630cad736>

Origins: Thorndike, 1923

Abstract

Compares the gains made in scores on the Thorndike-McCall Reading Tests for Latin and non-Latin pupils in the ninth grade over a period of one year and one-half year. The comparisons are always based on pupils making equal scores on the beginning test. The superiority in gain of the Latin pupils is at once obvious. The gain made by the Latins is about one and one-half times the gain made by the non-Latins. It is interesting to note, however, that the superiority of gain for the whole year is the same as that for the first half year. Whatever caused the superior gains of the Latins was a feature of the first half year. It is hard to find adequate reasons why the second half year of the study of Latin should have had zero effect. From Psych Bulletin 20:06:00607. (PsycINFO Database Record (c) 2018 APA, all rights reserved)

Far transfer sells

Unlock Hidden Potential!

Build Stronger Learning & Thinking Skills

LearningRx brain training gives your brain a workout, helping kids and adults learn more easily, think more quickly, and unlock hidden potential!

Discover what your mind can do

... memory, flexibility, and more with the world's most popular brain training program.

Start Your Personalized Brain Training

...s of Users. Billions of Neurons. Infinite

Start now

Exercise Your Brain

(so you can be your best)

BrainHQ is your personal headquarters for working out your brain. Think of it as a personal gym, where you exercise your memory, attention, brain speed, people skills, intelligence and navigation instead of your biceps, triceps, and quads. Just as our bodies require care and exercise over the course of life, so does your brain. BrainHQ provides the exercise your brain needs to be at its sharpest.

Our educational system loves the idea of far transfer

Date created: June 24, 2019

Music Students Score Better in Math, Science, English Than Nonmusical Peers

Cognition and the Brain Neuropsychology

Effect more pronounced for those who take instrumental rather than vocal music, study says

STORY

Music and arts classes are often first on the chopping block when schools face tight budgets and pressure to achieve high scores on standardized tests. But it's precisely those classes that can increase student interest in school and even benefit their math achievement, according to a new study.

4. Math develops flexible thinking and creativity

Practicing math has been shown to improve investigative skills, resourcefulness and creativity. It helps us to bend our thinking and do things that don't work. We need to be able to think in any way that works.

This is because math problems often have more than one way. The first path may not work, so you have to be creative to think of new pathways. Creativity is strengthened with math.



Master Dyslexia with Brain Exercises for Adults

These exercises can also help with ADHD & Autism spectrum disorders.

... playing chess every day can improve your cognitive skills.

Chess every day can improve your cognitive skills

Research Finds Chess More Beneficial In Lower Grades

 **FM Mike Klein** 
Feb 12, 2019, 12:32 PM | 47 | Misc

The preliminary findings of a [multi-year study](#) across the state of Alabama seem to indicate that chess instruction may improve student performance, especially amongst younger students. The study, conducted by researchers at **Tennessee Tech** and the **University of Alabama** and in conjunction with the [Alabama Chess in Schools](#), released its findings last month.

... useful for people with ADHD, ADD, Dyspraxia, etc.

Far transfer informs decisions and attitudes about parenting

[GAMES](#)

PLAYING BOARD GAMES IS GOOD FOR YOUR BRAIN!

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Cognitive Benefits From Playing With Building Blocks

ILONA VILUMA | 03 AUGUST, 2020 | 5 COMMENTS

The cognitive benefits of video games

Playing video games can improve your cognitive performance in a wide range of areas. For example:

- Playing 3D video games can [improve your recognition ability and spatial memory](#).
- Playing action video games can [improve your reaction time](#), without decreasing accuracy.
- Playing first-person shooters can [improve your mental flexibility](#), which means that it makes you better at rapidly switching between

FORBESWOMEN

How A New Study Shows Benefits Of Doll Play Through Neuroscience

Jennifer "Jay" Palumbo Contributor @

CEO of Wonder Woman Writer & Mom to two boys, one with autism.

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Feb 8, 2022, 08:17am EST

We hope far transfer will prevent or slow dementia

Join the 200,000+ members who keep their wits sharp with Braingle!

Braingle has a large vibrant community of smart people who contribute to the site in many ways. Some of the coolest features are only available to members. Want to sign up, so why not give it a try?

Brain Exercises for Dementia Patients



July 30, 2022

Medically reviewed by [Dr. Shukla](#)

LONGEVITY

10 Brain Exercises That Boost Memory

You already know physical fitness supports good health, but you may not realize exercising your mind is equally important to keep your brain in top shape.

Great News! As an AARP member, you qualify for over 35% off of BrainHQ.

Brain Training THAT WORKS

So does it work? Look at RCTs.

“That is, **no impact** on far-transfer measures was observed **regardless** of the type of population and cognitive-training program. The lack of generalization of skills acquired by training is thus an invariant of human cognition.” (Sala et. al., 2019, Near and Far Transfer in Cognitive Training: A **Second-Order Meta-Analysis**

In over a half century, no systematic body of evidence demonstrating the effectiveness of any general problem-solving strategies has emerged. ... There is **no body of research** based on randomized, controlled experiments indicating that **such teaching leads to better problem solving**. (Sweller, Clark and Kirschner, 2010)

"The results of our study, in combination with many meta-analyses (Melby-Lervåg et al., 2016, Sala and Gobet, 2017, Soveri et al., 2017) demonstrates that **cognitive training fails to provide strong evidence for far-transfer effects.**" (p

Abstract

A number of studies suggest that teaching children how to play chess may have an impact upon their educational attainment. Yet the strength of this evidence is undermined by limitations with research design. This paper attempts to overcome these limitations by presenting evidence from a randomised controlled trial (RCT) involving more than 4,000 children in England. In contrast to much of the existing literature, we find no evidence of an effect of chess instruction upon children’s mathematics, reading or science test scores. Our results provide a timely reminder of the need for social scientists to employ robust research designs. Jerrim et al., 2017

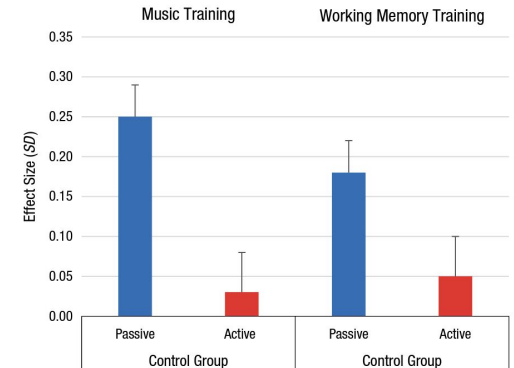


Fig. 1. Results from the two meta-analyses of the experimental studies on music and working memory training: overall far-transfer effect sizes as a function of the type of control group (passive vs. active). Error bars represent standard errors.

How about in older adults? Hmmm.

- We found significant gains on verbal and visuospatial working memory. The effects were maintained at follow-up only for verbal working memory.
- Far-transfer effects were not verified, except for the studies whose Cattell Test was used to assess reasoning.

Borella et al., 2010

Conclusions

Each ACTIVE cognitive intervention resulted in less decline in self-reported IADL compared with the control group. Reasoning and speed, but not memory, training resulted in improved targeted cognitive abilities for 10 years.

Rebok et al., 2014

Results

A strong effect size was observed for cognitive exercise interventions compared with wait-and-see control conditions (WMD = 1.07, CI: 0.32–1.83, $z = 2.78$, $N = 7$, $p = 0.006$, $N = 3,194$). RCTs with follow-up greater than 2 years did not appear to produce lower effect size estimates than those with less extended follow-up. Quality of reporting of trials was in general low.

Conclusion

Cognitive exercise training in healthy older individuals produces strong and persistent protective effects on longitudinal neuropsychological performance. Transfer of these effects to dementia-relevant domains such as general cognition and daily functioning has also been reported in some studies. Importantly, cognitive exercise has yet to be shown to prevent incident dementia in an appropriately designed trial and this is now an international priority.

Valenzuela et al., 2007

Special considerations in older adults

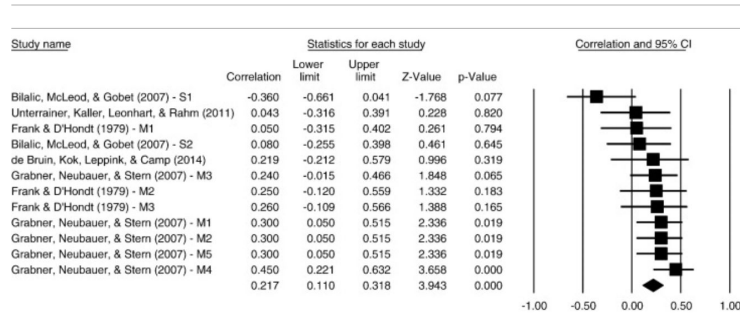
- Are we trying to train new abilities (and enhance untrained abilities) or prevent the loss of abilities we already have?
- Brain as a muscle vs. brain as a computer
- Do you need to improve certain cognitive abilities to maintain activities of daily living? Could this, then, improve cognitive abilities?

Common sense break! Take a step back

- Does understanding physics help you when chopping down a tree?
 - Does knowledge of baking measurements help you learn fractions?
 - Does gardening expertise help you learn science?
 - (Is this far transfer, or just generalization? Can you tell the difference?)
-
- Does going to chess club prepare you for talking to teachers?
 - Do private music lessons and daily practice build character?
 - Does playing video games enhance your ability to solve puzzles?
 - (What cognitive benefits of an activity might arise from something other than the intellectual content?)
-
- What skills and abilities do we value or require and how do we communicate that in our culture?

Why is this belief so prevalent?

1. There is a huge amount of evidence that people who succeed at music, chess, or Latin, will receive higher scores in math, science and writing.



Burgoyne et al., 2016

The researchers found that taking music courses at higher- or mid-SES schools relates to higher math scores. Mackin Freeman said that's not a surprise given the ways in which music and math overlap.

"If you think about it at an intuitive level, reading music is just doing math," he said. "Of course, it's a different type of math but it might be a more engaging form of math for students than learning calculus."

Daniel Mackin Freeman

Conclusion

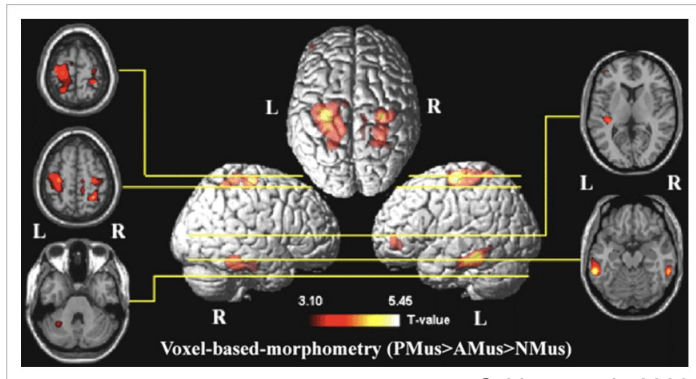
All in all, our review points to an association of musical training and enhanced cognitive performance spanning from executive functions to creativity. That is, even if in some cases the benefits were restricted to the auditory domain, the available studies suggest that musical experience is linked to benefits in unpracticed tasks and cognitive functions unrelated (or at least not obviously related) to musical abilities. However, it is important to note that the causal relation between the observed benefits and musical experience may not be straightforward,

Why is this belief so prevalent?

2. It makes intuitive sense.

3. Neuroplasticity is definitely possible throughout the lifespan, and undoubtedly occurs as a result of some “brain-boosting” activities. This is best studied in the context of musical training.

4. There are many potential mechanisms that could explain the benefit of brain training, and they probably depend heavily on context.



Schlaug et al., 2006

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Daniel Mackin Freeman

Lack of far transfer does not necessarily mean lack of value

- But, it's possible that training programs designed to correct or prevent dyslexia, dementia, autism, and other conditions are scammers



If far transfer doesn't work, what actually does?

- Exercise
- Gut health
- Nutritious diet
- Vision training for athletes
- Non-traumatic environment
- Parental nurturing