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New Research: $13 Christmas gifts = 13 point gain in kids' IQ

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Shoppers, you might want to redo your gift list after you read this.

Compare that to the cost of these games, which average only $13:

Deck of Cards

Blink

Azada

SET

Perfection

Chocolate Fix

Rush Hour

Qwirkle

Big Brain Academy

Picross

Dr. Silvia Bunge, a neuroscientist at UC Berkeley, has long been interested in understanding the development of children's intelligence. She's been measuring kids' intelligence and scanning their brains for several years in order to understand what exactly makes some brains function better than others. This has given her unique insight into the mental processes kids are capable of, and how to test for it. Last year, Bunge and her graduate students decided to see if they could train up, or sharpen, children's minds. Their study might sound remarkably simple, but the results have been flat-out astonishing.

First, they went looking for off-the-shelf board games, card games, and video games that demanded distinct mental functions. One group of these games was chosen because they'd give children's *reasoning ability* a workout – these games require forethought, planning, comparisons and logical integration. The games chosen were card games like SET, the traffic-jam puzzle Rush Hour, and Qwirkle, a cross between Dominos and Scrabble. For the Nintendo DS, they chose Picross and Big Brain Academy. There were also two games for the computer – one called Azada, another called Chocolate Fix.

Bunge's team brought the games to an elementary school in Oakland with historically low state test scores. The researchers asked some second, third and fourth graders to stay after school to play. The kids' IQ averaged a 90, and their brain speed (a subtest of intelligence) ranked them at only the 27th percentile. The children's parents, on average, were high-school dropouts. These were the kids

every education policy hopes to target, and every thought leader has an opinion on how to improve.

Twice a week, the kids played the games for an hour and fifteen minutes. Every fifteen minutes the kids moved to a new table, to make sure their brains always had something new to figure out. (The neuroscientists thought it was important the sessions remained fun.)

After just eight weeks – twenty total hours of game playing – Bunge's team retested the children's intelligence. They were specifically interested in the kids' reasoning ability. According to the classic theories of intelligence, reasoning ability is considered both the core element of intelligence and also the hardest to change. Allyson Mackey, Bunge's graduate student who supervised the study, thought she might see gains of 3 to 6 points, at most.

"From adult training studies, we knew some improvement was possible," said Bunge. "But it was enormous." The children's reasoning scores, on average, leapt 32%. Translated to an IQ standard, that bumped them 13 points.

For comparison, consider that a 12 point gain is normally how much a child's IQ goes up after *an entire year of school*. By giving the children precisely targeted games, Bunge and Mackey were able to beat that, in just 20 hours of game playing.

Reasoning ability was not the neuroscientists' only target. Bunge's team was also interested in another component of intelligence, called *processing speed*. So, at the same time, a second group of games was assembled, and a second group of kids spent their afternoons in that classroom. "Those games didn't require memory or strategy, just very rapid visual recognition," described Mackey. These included traditional card games like Spoons and Speed, the video game Brickbuster, the board game Blink, and Perfection, in which kids must push 25 plastic shapes into a springboard in under a minute.

After the eight weeks, these kids' cognitive scores were tested as well. The kids who trained for speed saw their processing speed scores leap 27%; they began well-below average, but quickly reached a level far above-average. In football, a famous adage is "You can't teach speed."
That doesn't seem to be the case for the brain.

Each group's improvements were domain-specific, so it was clear the games were the cause. The speed group saw only insignificant gains in reasoning ability. Those

who trained on the reasoning games (and improved their reasoning) saw almost no speed benefit. Neither group saw improvement in working memory. This also suggests that cross-training is necessary for full-scale intelligence.

Bunge has concluded, "All parts of intelligence are malleable. They're all in the brain, and all of the brain shows plasticity. There's no evidence that some regions are most or less plastic than others." The presumption that some components of intelligence are more fixed than others isn't backed up by the new science.

Bunge's team, thrilled with their results, are continuing to build on this with new experiments. They're currently looking for more schools in Northern California to participate. The original study is now being reproduced, with kids who are having their brains scanned before and after the game training. Bunge is hoping to learn what's changed, on a neural level, in just eight weeks. She expects to find a pattern toward greater efficiency – more focused activity in the specific regions required by the tasks, and less activation of unnecessary brain regions. She might also find how the frontal lobe and the parietal lobe fire in concert, or even a physical change in the nerves connecting the two brain regions, making the network faster.

Perhaps the most important finding in Bunge's data is that the training helped the neediest kids the most. The farther down a child started on the rankings, the quicker and greater was his cognitive improvement. This is extremely rare in education interventions. Usually, smart kids benefit most, and the kids who struggle at the beginning only fall farther behind. Broadscale education reforms like smaller classes, teacher training, charter schools, and all-day schedules have pricetags in the millions of dollars.