

How training the brain could boost economic growth

In a world where solutions are harder to come by, we must maximise the power of the human mind



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In the German school system, fate reaches out for children at around the age of 10. Kids start their secondary education at institutions ranging from an academic *Gymnasium*, with a high probability of ultimate university entry, to a more vocationally focused *Realschule*, where the education is famously excellent but unlikely to provide access to the most sought after and high-paying careers. Many German parents would like the *Gymnasium* for their children. They try hard to get them in.

That makes a set of results [published earlier this year](#) in the Journal of Political Economy all the more remarkable. They report on a study in which a group of seven-year-olds were given 12 hours of "working

memory" training in place of their normal school lessons. Working memory is the capacity to hold in mind and manipulate multiple pieces of information: the lengths of the sides of a rectangle, for example, while calculating its area. It is a basic cognitive skill thought to be valuable for many areas of academic success, particularly in solving maths problems but also reading and paying attention in general.

The study was carefully conducted, randomising both schools and classes within schools to create a treatment group and a control group, with years of follow-up afterwards to examine how this fairly modest intervention affected the children. The central result? Children who received the training in working memory at age seven were 16 percentage points more likely to end up in the *Gymnasium*, 46 per cent to 30 per cent, than those who did not — an enormous difference, as these things go, in a critical measure of life outcomes. The training appeared to benefit all children, advantaged and disadvantaged, those who did well on initial tests and those who did not, about the same.

One obvious conclusion is that children may benefit from training in working memory. (For tiger parents who don't want to wait for education authorities to ponder the research, a version of the training protocol is available in a commercial app called Nuroe.) It adds to the evidence that a child's early years are formative and interventions at this stage have particularly high returns because the benefits compound over time.

But it also points to something even more profound: that cognition is malleable, at least somewhat, and can be affected both for good and for bad by training, by environment and by behaviour. At a time when many advanced economies struggle to generate economic growth; when artificial intelligence is displacing ever more routine jobs and raising, yet again, the cognitive bar for access to the most desirable careers; and when declining cognition at the end of life is creating suffering and cost for people with dementia and their families, it makes sense to pay the

closest attention to how we might improve the functioning of our minds.

Industrial strategy is currently back in fashion but improvements in cognition are, potentially, a lower-cost and higher-impact way to raise productivity. We need a cognitive strategy for economic growth.

Brain training would be part of such an effort but only part. Another issue to tackle is air pollution. There is [considerable evidence](#) that particulates, especially fine and ultrafine particles below 2.5 micrometres in diameter, not only cause a host of long-term health problems such as dementia, stroke, lung cancer and heart disease, but also stunt child development and make you dumber, right here and right now. A study of [Israeli high school students](#), for example, showed significantly lower exam results, leading to lower rates of university education, for students who took their exams on a day with dirtier air.

It would also require a reckoning with the [recession in human cognition](#) brought by modern technology. The search engines at our fingertips erode our incentive to remember word definitions or calculate; immersion in video content harms our capacity to read or write; and constant exposure to addictive, attention-demanding social media swamps our cognitive capacity and undermines our ability to concentrate.

AI threatens to make it worse. Researchers warn of “cognitive offloading” as humans pass the basic tasks of problem solving to AI chatbots. It is a curious contrast that people are ever more likely to exercise their physical muscles in a gym even as they let their mental muscles grow flabby. AI tools pose a nasty dilemma. Failing to master them may make you irrelevant in the workplace; relying on them may destroy the very skills that make you useful. In his 1957 story *Profession*, the science fiction writer Isaac Asimov wrote a parable about technology that could instantly imprint humans with specialist knowledge, at the cost of making them unable to learn or innovate. He often was prescient.

Cognitive power matters obviously to individuals. It matters also to society. Our human capital is part of what makes us productive and until such time as AI is actually able to make discoveries, rather than regurgitate its training data, it is only human invention that will create new knowledge and push humanity forward. Modern technology provides ways both to train our minds, as the researchers in Germany were able to do, and to erode them: a contest between cognition and uncognition. It is a contest of the highest importance for our future — one we need to win.

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