Meditation Improves Intelligence

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Abstract

Teachers and parents often remind children to "pay attention." It is hard to imagine how someone could learn a new skill or solve a problem without paying attention. Attention is the act of directing our focus on what is important. When we pay attention, we actively direct our focus on whatever would be most helpful in handling the task at hand. Meditation is simply a word for the practice of paying attention. In their paper "Buddha's Brain: Neuroplasticity and Meditation," Davidson and Lutz showed that paying attention is a skill that can be learned (similar to learning a language). Meditating trains your ability to pay attention. To prove their point, Davidson and Lutz investigated how two forms of meditation, *focused attention* and *open monitoring*, affect the brain. They found that focused attention meditation causes brain changes similar to those caused by learning other skills (like language learning). And they found that open monitoring meditation helps people use their brain's limited resources more efficiently. In this paper, I will show that meditation makes people more intelligent.

1 Introduction

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2 Focused Attention Meditation

In the paper "Neural Correlates of Attentional Expertise in Long-Term Meditation Practitioners," Brefczynski-Lewis et al. asked research participants to focus their attention on a single visual point (Brefczynski-Lewis et al., 2007). The participants wore electrodes (fMRI) so that researchers could measure the electrical activity in their brain while they paid attention.

Participants had a range of meditation experience. "Novices" had no prior experience. They were given focused attention instructions during the week before their research session. "Experts" had between 10,000 and 54,000 hours of meditation experience.

From the experiment, the researchers learned that expert meditators had more electrical activity in their brains than novices while they paid attention. But, after a certain amount of meditation experience (37,000 hours), the amount of electrical activity in an expert meditator's brain began to decline as they became more experienced.

This inverted U-shaped curve is similar to what researchers have seen when studying people who have practiced other skills. Language learners follow a similar pattern. Experts have more electrical activity in their brains than novices during experiments, but electrical activity begins to decrease after a certain amount of experience—possibly because we learn to only pay attention to what is most important.

To see how focused attention meditation affects our ability to continue to pay attention during distractions, the researchers played distracting sounds every two seconds. They found that expert meditators had less electrical activity in their brain's amygdala (as stated in "Neuroanatomy, Amygdala," electrically stimulating the amygdala evokes fear and anxiety in humans) (AbuHasan et al., 2023). Expert meditators may therefore have experienced less anxiety after hearing the distracting sounds, and found it easier to concentrate.

3 Open Monitoring Meditation

In their paper "Mental Training Affects Distribution of Limited Brain Resources," Slagter et al. studied how open monitoring meditation affects the amount of present-moment information we are able to pay attention to (Slagter et al., 2007). While we are awake, we experience a stream of information about the world—external information like sights, sounds, smells, tastes, and touches, as well as internal information like emotions, thoughts, and bodily functions. Slagter et al. investigated whether people who practice meditation can pay attention to more present-moment information about the world.

Research participants in this study included "practitioners" and "novices." Practitioners had just completed a three-month meditation retreat where they meditated for 10–12 hours a day. Novices, on the other hand, were given a one-hour meditation class and asked to meditate for 20 minutes a day for a week prior to each research session.

To measure how much present-moment information a participant could pay attention to, the researchers showed participants a rapid stream of letters and two numbers. Each participant was asked to identify the two numbers. Researchers measured how many of the two numbers each participant identified correctly, and how much of their brain's limited resources were being used (P3b amplitude, measured using EEG).

Meditation practitioners were able to identify both numbers far more often than novices. They were able to pay attention to more of the present-moment stream of information.

The researchers also found that meditation practitioners used less of their brain's limited resources than novices during a session. That might be why practitioners were able to identify both numbers more often—they needed less of their brain's resources to pay attention to the first number, so they had more resources available to pay attention to the second number.

4 How Is Attention Related to Intelligence?

Intelligence is the ability to make predictions and solve problems. Artificial intelligence (AI) research has recently proven that "attention is all you need" to make predictions and solve problems in any domain (Vaswani et al., 2017).

The GPT family of neural networks, including ChatGPT[1], are general-purpose models of our ability to pay attention. All GPT models use an attention mechanism to decide what to pay attention to in order to solve the problem at hand.

GPT models are "trained"—they learn to solve problems by reviewing the answers to problems that were already solved. AI research has shown that two of the most important factors in improving a model's ability to solve problems are:

1. The amount of training data (the number of unique problems a model can learn from)
2. The size of the neural network (the number of neurons, or independent problem solvers, involved in solving a problem)

In the GPT family of models, scaling up the amount of training data and the model size has drastically improved a model's general intelligence. While GPT-1 was trained on 1 GB of data and had up to 117M neurons, GPT-3 was trained on 45 TB of data and had up to 175B neurons (Radford et al., 2018; Brown et al., 2020). GPT-3 proved to be better at solving problems in every possible domain.

Slagter et al. showed that open monitoring meditation enables us to pay attention to more of the present-moment stream of information. As in GPT neural networks, the neural networks in our brain can use the additional data about the world that meditation provides to train themselves to become better general-purpose problem solvers.

Brefczynski-Lewis et al. showed that focused attention meditation increases the amount of electrical activity that happens in our brain while we pay attention (Section 2). This increase in activity may be attributed to an increase in the size of our brain's neural networks. As is true when we increase the number of neurons in a neural network like GPT, growing the number of neurons in our brain can improve our ability to make predictions and solve problems in any domain.

5 Meditation Increases IQ

IQ is a measure of a person's general intelligence. If meditation indeed improves intelligence, we would expect meditation to increase a person's IQ.

[1] https://chat.openai.com/

The paper "Case Study: Improvements in IQ Score and Maintenance of Gains Following EEG Biofeedback with Mildly Developmentally Delayed Twins" investigated whether EEG biofeedback meditation improves IQ (Fleischman & Othmer, 2005). While a person's IQ is generally stable throughout their life, each study referenced in that paper found that EEG biofeedback meditation increased people's IQ.

In one of the referenced studies, "Neurofeedback Combined with Training in Metacognitive Strategies: Effectiveness in Students with ADD," Thompson and Thompson reported that 98 children who practiced EEG biofeedback meditation gained an average of 12 IQ points (Thompson & Thompson, 1998).

6 Conclusion

Since meditation improves our ability to pay attention, and attention is all you need for intelligence, the transitive property tells us that meditation improves intelligence. I believe that additional research into how different forms of meditation affect IQ would help us understand the most effective ways to improve our intelligence. Since many forms of meditation are free, meditating is a no-cost way to make yourself smarter.

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A Meditation Instructions

A.1 Focused Attention Meditation

Breathe as you usually would. Close your eyes and your mouth, and simply pay attention to how your breath feels against the inside of the tip of your nose. Each breath is unique... try to notice the subtle details.

For more about focused attention meditation, I would recommend the book *Mindfulness in Plain English* by Bhante Henepola Gunaratana (Wisdom Publications).

A.2 Open Monitoring Meditation

Close your eyes, and pay attention to as much of what is happening in the present moment as possible. Pay attention to external events including sounds, smells, tastes, and touches, as well as internal events like emotions, thoughts, and bodily functions.

A.3 Alternating Focused Attention and Open Monitoring Meditation

At the start of your in-breath, practice focused attention meditation—pay attention to how your breath feels against the inside of the tip of your nose. Then, practice open monitoring meditation for the rest of your in-breath—pay attention to as much of what is happening in the present moment as possible.

Repeat the previous steps during your out-breath—at the start of your out-breath, practice focused attention meditation; then, practice open monitoring meditation for the rest of your out-breath.

B 6-Minute Meditation Routine

3 minutes: Focused Attention Meditation
3 minutes: Open Monitoring Meditation

C 21-Minute Meditation Routine

∼7 minutes: Focused Attention Meditation
∼7 minutes: Alternating Focused Attention and Open Monitoring Meditation
∼7 minutes: Open Monitoring Meditation

Instead of setting a 7-minute timer for each step, you can set a 21-minute timer and continue with each step until you are consistently paying attention. Once you have been constantly paying attention for several breaths, you may move on to the next step.

D Constant Meditation

Always actively direct your attention. When the situation calls for it, focus your attention on a specific object—a physical object, or a thought. If no specific object requires your attention, openly monitor—pay attention to as much of what is happening in the present moment as possible.