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Proven effects of meditation on the brain

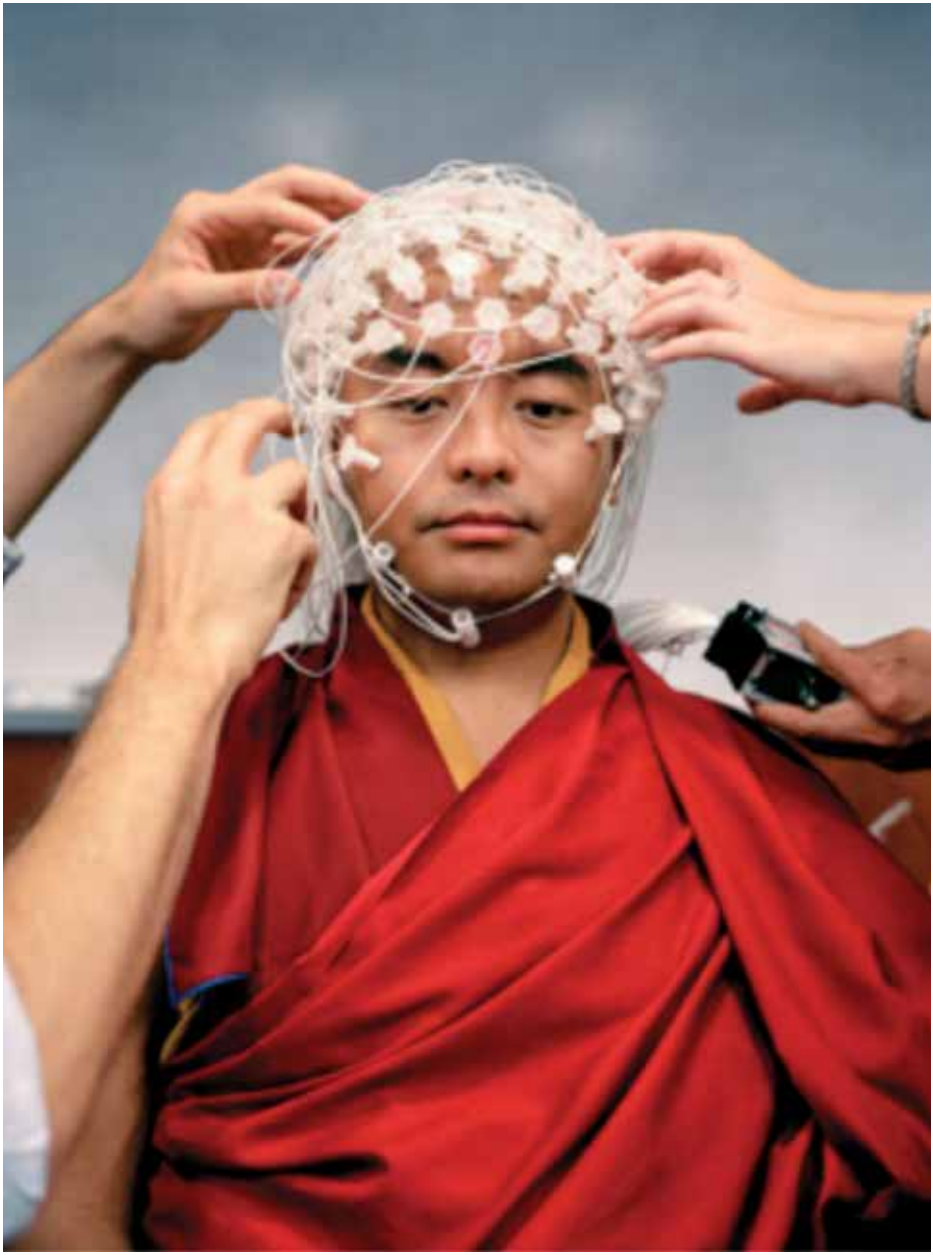
Presentation

As you can tell by the title, my project focuses on the proven effects of meditation on the brain. I chose this topic because I personally have been meditating for two years now and it has affected my overall mood and lifestyle on such a level that I couldn't avoid investigating on the reason; not only as a personal interest but also for me to share it with as many people as I can. When the instructor told us not to choose a boring topic or just an easy way out kind of project, I had meditation on mind without hesitation.

Meditation is also such a wide topic, there are so many things to learn to become a real master of your mind.

We all want the kind of mindset that allows us to be calm while driving to work in bumper-to-bumper traffic: Either the calm that allows us to act responsively rather than reactively when family or colleagues want to argue; or even the calm that helps us to stop ruminating about the past or worrying about the future so we can sleep well all night. Wouldn't it be nice if such a state of mind were always within our grasp? The truth is, attaining this state in our daily lives, especially in the mind-set of chaos, is one of our greatest challenges.

Why? For many of us, the stress and anxiety we experience seem to be greater than



ever before. Our days are spent racing the clock. We rarely pull away from our digital devices, and end up feeling overwhelmed and overstimulated. We are so focused on «the next thing», that we often miss what's happening in front of us. Our bodies are awash with cortisol, the stress hormone that can cause us multiple problems, from muscle tension to exhaustion. It is now estimated that over 70% of doctor visits are due to stress-related issues.

Methodology

A lot of different research has been done on the science behind meditation, which made my project harder. In fact, I spent most of the time doing research and highlighting important information from dozens of articles. Once I gathered up everything, I layed out all my ideas and finally ended up doing three blocks. In the first place, I take a glance at the backgrounds of meditation to put the reader in situation. Mainly because of the misconceptions about meditation, in this block I include what meditation is and its history, the types of meditation and the different techniques.

The second and main part of my project is the scientific explanation to meditation, which is based on scientific researches. And last but not least, the practical part. In this block I had an initial idea that consisted in taking an electroencephalogram during a 15 minute meditation and proving the variations of brain-function on myself due to the studies discussed in part 2. It would have been done by a professional neurologist (Albert Molins) but later on I found out that brain behaviour changes can't be displayed by an electroencephalogram, the doctor explained, and I quote «*EEG is a test that does not allow to see much more than epileptic activity. The modifications caused by relaxation are minimal and impossible to quantify with the devices available in EEG centers. Suddenly, when one relaxes, the alpha activity is better visualized and when you make them think, it is difficult; but the quantitative measurement of this and the pre-post relaxation comparison becomes impossible without complex programs that are only used in research.*»

Then, I thought that meditation could also modify other body behaviours such as cardiovascular, and as I deepened in the research, I found out more than expected. How does meditation affect you physiologically? It appears to produce changes in brain activity, but it can also lower your heart rate, blood pressure, breathing rate, oxygen consumption, adrenaline levels, and levels of cortisol, a hormone released in response to stress.

So I ended up doing an electrocardiogram to get the proof. In my project I show two pictures: the first picture is from before my meditation session, where you can tell my heart rate is at its frequent pace (100 ipm). If we compare it to the second picture, my heart rate has relaxed, being now at a 70 ipm, which means that the medi-

tation was efficient. It is obvious that after any relaxation mode, the heart pace will slow down. But when it comes to meditation, this relaxation follows up to all the hundreds of overall health benefits talked about in my project.
As i see it, there is a point for discussion we should bring to the surface. We seem to be eating well and exercising on a regular basis, but we completely ignore meditation even when we do know meditation is essential for a healthy lifestyle.
There has been a greater approach to understanding meditation lately with the help of science. This has led to many efforts to find evidence about the benefits of these practices in: general well-being, reduction of physical symptoms due to chronic diseases, and general personal improvement.
In this project I tell you why and how to meditate. I intended this to be a very foundational work that can get anyone to actually practically start meditating, and perhaps introduce this practice to a daily basis. What I share is: why meditation is so important, how to actually meditate, th techniques and, at the end, I cover some of the common pitfalls and traps that people experience with meditation, which prevent them from building a consistent meditation habit. You cannot get the benefits of meditation by trying it once or twice, you have to make this a habit.
On the whole, the main purpose of this research is focused on proving the overall effects of meditation on the body and mind.

Body of the project

Is meditation necessary? Maybe not, but what if someone told you there was a skill you could learn that didn't take much time, didn't require any fancy tools, and could improve your health, relationships and sleep... Wouldn't you try it? Before getting into the science of meditation, I think it is important to understand what meditation is. I want to prove the effects that it has on the brain, and therefore the importance of meditation and the impact it can make on your lives as it has had on mine these past two years.
What is meditation? It is technically understood as the act of giving your attention to only one thing, either as a religious activity or as a way of becoming calm and relaxed. This can be channeled down with many techniques, such as transcendental meditation, mindfulness meditation or yoga, which are the most known.
Moving on to the scientific view of meditation, for thousands of years people have practiced meditation for spiritual, emotional and physical well-being. Yet from a scientific perspective, how exactly does meditation affect your body? It all starts in the brain: during meditation we can see increased activity in regions directly correlated with decreased anxiety and depression along with increased tolerance. And it has been found to improve memory, self-awareness, and goal-setting. When scientists compared brains of buddhists monks and new-meditators, they found the region of

the brain associated with empathy to be much more pronounced in the monk. And it also literally changes your brain waves: we can measure these frequencies. Meditators have higher levels of alpha waves, which have been shown to reduce feelings of negative mood, tension, sadness or anger. If that wasn't enough, it also physically changes our brain shape and size. Studies found that after eight weeks of a meditation program, grey matter was more associated with learning, memory processing and emotion regulation and yet the amygdala which deals with stress, blood pressure and fear had decreased grey matter. When we look at the entire body, not only do we see decreased blood pressure, but also an increase in the variability of your heart rate -which I get more into in the practical part. While this may sound harmful, it actually plays a critical role in properly transporting oxygen and carbon dioxide out of your body. In a study where meditators and non-meditators were given the flu virus, meditators were able to produce a greater number of antibodies and had increased immune function.
If we go a little deeper, we can even see changes on a cellular level, your chromosomes have protecting protein complexes called telomerases which help produce damage to your DNA and lower cell death, and a shorter telomerase has been linked to several diseases such as cardiovascular disease, diabetes, cancer and alzheimer. Amazingly, when cancer survivors completed a meditation program, their bodies showed significant increases in telomerase length; it is believed that psychological intervention, particularly decreasing stress, has a direct affect on the enzyme telomerase which has been shown to counteract shorting by adding DNA to the shrinking telomerases.

Conclusion

All in all, I wanted to get into the roots of meditation and see how it can emerge in the human's brain with such great benefits.
What I mainly learned from this project is that the brain is a muscle that must be trained just like any other, and meditation has been proven of providing strength to the brain. Meditation is not a substitute for any medical advice on a healthy lifestyle, it won't cure cancer of course, but much like hitting the gym can grow your muscles and increase your overall health, it seems that meditation may be a way of working out your brain with extra health benefits. I didn't get across many difficulties during the process of this project, firstly because I was provided by my tutor's help, but mostly because it is a topic that I genuinely enjoy and it involves many disciplines that I like, such as psychology, neuroscience, theology, philosophy..
Finally, I want to note that I am satisfied with the results and I hope that it is useful for the people who are interested in it.

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