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There are no translations available.

Meditation: Cognitive Benefits - A Selection of Articles

1. **Meditation Silences Internal Chatter**

When we are very small we voice our thoughts out loud, when playing for example. As we mature the voice becomes 'on the inside', that is, we think in words inside our heads. There is a third stage where that too is supposed to go quiet and pure thought without words takes over. It's much faster and more accurate than thinking in words.

Because most people don't mature that far, the brain gets stuck in bad habits of talking to itself in words, inside your head, all the time, and never moves on. I don't mean hearing voices, one is well aware that it is one's own thoughts, sometimes they are in conflict -like two inner voices -which is what I called 'in two minds'.

ALL this internal chatter [except for children at that stage of development] is bad news. Practising meditation is one way of shutting it up [with practice] and then we are free to move on to the next stage of development.

For those who have never experienced thought without words, this can sound impossible. Believe me it isn't. Information is not lost when this change is made -it is gained. When this shift takes place we change matrix, altering brainwave patterns, growing [literally] new bits of brain,

changing the way we perceive things and think about things.

There are lots of different kinds of meditation and also many other methods of achieving this. For me, active meditation works best. You may need to try a few different methods before settling on what works well for you.

Sources

Alex Ramonsky

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2. **Effects of Level of Meditation Experience on Executive Processing**

This investigation examined the contributions of specific attentional networks to long-term trait effects of meditation. It was hypothesized that meditation could improve the efficiency of executive processing (inhibits prepotent/incorrect responses) or orientational processing (orients

to specific objects in the attentional field).

Participants (50 meditators and 10 controls) were given the Stroop (measures executive attention) and Global-Local Letters (measures orientational attention) tasks. Results showed that meditation experience was associated with reduced interference on the Stroop task ($p < 0.03$), in contrast with a lack of effect on interference in the Global-Local Letters task.

This suggests that meditation produces long-term increases in the efficiency of the executive attentional network (N6 -anterior cingulate/prefronta l cortex). The amount of time participants spent meditating each day, rather than the total number of hours of meditative practice over their lifetime, was negatively correlated with interference on the Stroop task ($r = -0.31$, $p < 0.005$).

Sources

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Authors: Chan D, Woollacott M

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3. **Meditation & Learning to Pay Attention**

Our sensory system is constantly bombarded with inputs, but owing to the brain's finite processing power, we are forced to pay attention to only a tiny proportion of these inputs at any given time. In a new study, Richard Davidson and colleagues report that intensive training in meditation can alter the way in which the brain allocates attentional resources to important stimuli, allowing people to improve their performance on a demanding visual task.

In the "attentional blink" task, volunteers were asked to identify two "target" stimuli—for example, two particular numbers—in a stream of rapidly presented "non-target" stimuli—for example, letters—which are irrelevant to the task. When the first target number appears on the screen, it captures the attention of the subject, and this can prevent the person from spotting the second target if it appears within around half a second of the first (the attentional blink). It is as if the brain is so busy processing the first target that it can't also process the second, and therefore the second target goes unnoticed. However, the attentional blink does not represent a structural processing bottleneck. Most subjects are able to spot the second target on at least a small proportion of trials. Since this task gauges the ability of subjects to allocate cognitive resources efficiently when multiple stimuli compete for attention, it is perfectly suited for investigations of the effects of mental training on attention.

Previous studies had reported that the act of meditation can alter cognitive and perceptual abilities and neural responses. However, Davidson and colleagues wondered whether volunteers who received three months of intensive training in a particular type of meditation, known as Vipassana meditation, would allocate attentional resources more efficiently and therefore show enhanced performance on the attentional blink task, a task that taps into similar skills used during training without directly involving meditation. Vipassana meditation encourages "non-reactive awareness"—a state of mind in which individuals cultivate awareness of stimuli without judgments or affective responses to those stimuli.

Since Vipassana meditation allegedly reduces mental distraction, the authors hypothesized that

volunteers (“practitioners”) who attended the intensive training course, which involved 10–12 hours of meditation each day, would be more successful at identifying the second target, because the subjects’ attention would be captured less by the first target. Performance on the task before training was compared with performance after training, and also with that of a control group (“novices”) who were interested in meditation but received only one hour of training, and meditated for 20 minutes each day for the week that preceded each experimental session.

After the three-month training period, each member of the practitioner group showed improved detection of the second target, if it appeared within half a second after the first target. Only 16 out of 23 of the novice group showed a similar improvement. This reduction in the effect of the attentional blink is consistent with the idea that after training, practitioners were allocating a smaller proportion of their brains’ resources to the first target.

Another way of measuring the allocation of attention is to use event-related potentials—electrical changes associated with neural responses to sensory stimuli or cognitive tasks, which can be recorded through the scalp. When event-related potentials are recorded from subjects during the attentional blink task, a noticeable electrical change—called the P3b—is associated with the appearance of the first target. This event is believed to reflect the allocation of resources to the target. In the practitioner group, after three months of intensive mental training, the P3b that was associated with the first target was significantly smaller for those trials in which the subject was able to identify both targets. In other words, the event-related potentials appeared to show that less attention was being allocated to the first target, and this allowed the subjects to spot the second target.

To investigate further the possible link between attentional resource allocation, as reflected by the size of the P3b potential, and performance on the attentional blink task, the authors compared individual performance on the task with the event-related potentials recorded from each subject. Subjects who showed the largest decrease over time in the size of the P3b evoked by the first target also generally showed the greatest improvement in detection of the second target. This result further corroborates the view that the attentional blink is caused by excessive allocation of attentional resources to the processing of target 1.

Importantly, the subjects did not meditate during the attentional blink task. So these results indicate that intensive mental training can produce lasting and significant improvements in the efficient distribution of attentional resources among competing stimuli, even when individuals are not actively using the techniques they have learned.

Sources

Rachel Jones

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4. **Brain Scans Show Meditation Improves Concentration, Increases Attention**

For hundreds of years, Tibetan monks and other religious people have used meditation to calm the mind and improve concentration. This week, a new study shows exactly how one common type of meditation affects the brain.

Using a scanner that reveals which parts of the brain are active at any given moment, the researchers found that meditation increased activity in the brain regions used for paying attention and making decisions.

The changes were associated with the practice of concentration meditation, says study leader Richard Davidson, professor of psychology and psychiatry at the University of Wisconsin School of Medicine and Public Health and the Waisman Center. Practitioners were instructed to focus attention intently on a stimulus, and when the attention wandered off, to simply bring the attention back to the object, explains Davidson.

"In one sense, concentration mediation is ridiculously simple, but in another, it's extraordinarily difficult," adds Davidson. "If you try it for two minutes, you will see that it's not so easy. Minds have a propensity to wander."

In collaboration with colleagues Julie Brefczynski- Lewis and Antoine Lutz of the UW-Madison W.M. Keck Laboratory for Functional Brain Imaging and Behavior, Davidson compared newly trained meditators to people with up to 54,000 hours of meditation experience. The study is being published this week in the online edition of the Proceedings of the National Academy of

Science.

After the novices were taught to meditate, all subjects underwent a magnetic resonance imaging scan of the brain while they were meditating. Among all experienced meditators, the MRI scan found greater activity in brain circuits involved in paying attention.

"We found that regions of the brain that are intimately involved in the control and regulation of attention, such as the prefrontal cortex, were more activated in the long-term practitioners, " Davidson says.

A different picture emerged, however, from looking only at the most experienced meditators with at least 40,000 hours of experience. "There was a brief increase in activity as they start meditating, and then it came down to baseline, as if they were able to concentrate in an effortless way," says Davidson.

Effortless concentration is described in classic meditation texts, adds Davidson. "And we think this may be a neural reflection of that. These results illustrate one mechanism by which meditation may act in the brain."

While the subjects meditated inside the MRI, the researchers periodically blasted them with disturbing noises. Among the experienced meditators, the noise had less effect on the brain areas involved in emotion and decision-making than among novice meditators. Among meditators with more than 40,000 hours of lifetime practice, these areas were hardly affected at all.

The correlation between more meditation experience and greater brain changes does suggest that the changes were caused by meditation.

"If it were simply lifestyle, we would not expect a very strong correlation with hours of practice," Davidson says.

Other evidence for the neurological benefits of meditation came from a study Davidson reported in May, which showed that three months of meditation training improved the ability to detect a brief visual signal that most people cannot detect. "That was a more definitive kind of evidence, because we were able to track the same people over time," he says.

Psychologists have long considered an adult's capacity to pay attention as relatively fixed, but Davidson says: "Attention can be trained, and in a way that is not fundamentally different than how physical exercise changes the body."

The attention circuits affected by meditation are also involved in attention deficit hyperactivity disorder, which Davidson describes as the most prevalent psychiatric diagnosis among children in western countries.

Davidson says scientific studies of meditation are proving traditional beliefs about its mental benefits. Yet although meditation is often associated with monks living a life of simplicity, poverty, and prayer, "There is nothing fundamentally mysterious about these practices; they can be understood in hard-nosed western scientific terms."

And, he adds, a growing body of "hard-nosed neuroscience research" is attracting attention to the profound effects of meditation.

"This deserves serious scientific attention," he says. "It also explains why people spend time sitting on the meditation cushion, because of the effects on day-to-day life."

Davidson compares mental practice to physical exercise.

"We all know that if an individual works out on a regular basis, that can change cardiovascular health," he says. "In the same way, these data suggest that certain basic mechanisms of the mind, like attention, can also be trained and improved through systematic practice."

Sources

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5. **Meditation Can Improve Brain Function, Psychology Study Says**

Feeling anxious or depressed? You may one day be prescribed meditation rather than medication, thanks to a study conducted by researchers from the Department of Psychology and the Centre for Addiction and Mental Health (CAMH) at St. Joseph's Hospital. [Canada].

A research team that included Professor Adam Anderson of psychology, Norman Farb, a psychology PhD candidate, and Professor Zindel Segal of psychiatry are the first to use

functional magnetic resonance imaging (fMRI) to map brain activity changes in people trained in mindfulness meditation -the art of "being in the moment" and free of judgment.

The researchers scanned the brains of study participants as they completed two tasks. Participants were first asked to judge whether word prompts described their personalities, a task designed to trigger rumination or what the authors call "narrative" thought patterns. In another task, participants were instructed to monitor their responses to the words without further judgment in an attempt to coax them to be in the moment or adopt an "experiential" focus.

People with no meditation training showed very little change in brain activity from task to task. However, participants who had practised meditation regularly for eight weeks showed a more dramatic change in brain activity when asked to move from the narrative to the experiential focus - they shifted away from the midline brain regions to areas that regulate more primitive functions such as touch, pain and temperature sensation.

"This ability to alter brain activity may explain why so many studies show mood improvements with meditation. It turns out taking a break from some regions of the brain, which we tend to overuse, might be just what's needed to help you feel better," Anderson said. This is important because drugs for treating psychological conditions such as depression and anxiety have side effects, making their long-term use a challenge.

The results of this study, published in the December 2007 issue of Social Cognitive and Affective Neuroscience, are particularly germane because they measure the effects of meditation in "regular" people instead of frequently studied special populations such as monks.

Sources

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6. **Meditation: Protection Against Cognitive Decline**

Zen meditation, a Buddhist practice centered on attentional and postural self-regulation, has been speculated to bring about beneficial long-term effects for the individual, ranging from anxiety reduction to improvement of cognitive function. In this study, we examined how the regular practice of meditation may affect the normal age-related decline of cerebral gray matter volume and attentional performance observed in healthy individuals. Voxel-based morphometry for MRI anatomical brain images and a computerized sustained attention task were employed in 13 regular practitioners of Zen meditation and 13 matched controls. While control subjects displayed the expected negative correlation of both gray matter volume and attentional performance with age, meditators did not show a significant correlation of either measure with age. The effect of meditation on gray matter volume was most prominent in the putamen, a structure strongly implicated in attentional processing.

These findings suggest that the regular practice of meditation may have neuroprotective effects and reduce the cognitive decline associated with normal aging.

Sources

"Age effects on gray matter volume and attentional performance in Zen meditation", Neurobiol Aging. 2007 Jul 24. Authors: Pagnoni G, Cekic M

7. **Body-Mind Meditation Boosts Performance, Reduces Anxiety**

A team of researchers from China and the University of Oregon have developed an approach for neuroscientists to study how meditation might provide improvements in a person's attention and response to chronic stress.

The study, done in China, randomly assigned college undergraduate students to 40-person experimental or control groups. The experimental group received five days of meditation training using a technique called the integrative body-mind training (IBMT). The control group got five

days of relaxation training. Before and after training both groups took tests involving attention and response to mental stress. The findings appear online this week ahead of publication in the Proceedings of the National Academy of Sciences.

The experimental group showed greater improvement than the control in an attention test designed to measure the subjects' abilities to resolve conflict among stimuli. Stress was induced by mental arithmetic. Both groups initially showed elevated release of the stress hormone cortisol following the math task, but after training the experimental group showed a drop in cortisol release, indicating a greater improvement in stress regulation. The experimental group consequently showed lower levels of anxiety, depression, anger and fatigue than was the case in the control group.

"This study improves the prospect for examining brain mechanisms involved in the changes in attention and self-regulation that occur following meditation training," said co-author Michael I. Posner, professor emeritus of psychology at the University of Oregon. "The study took only five days, so it was possible to randomly assign the subjects and do a thorough before-and-after analysis of the training effects."

The IBMT approach was developed in the 1990s. Its effects have been studied in China since 1995. The technique avoids struggles to control thought, relying instead on a state of restful alertness, allowing for a high degree of body-mind awareness while receiving instructions from a coach, who provides breath-adjustment guidance and mental imagery while soothing music plays in the background. Thought control is achieved gradually through posture, relaxation, body-mind harmony and balanced breathing. The authors noted in the study that IBMT may be effective during short-term application because of its integrative use of these components.

IBMT has been found to improve emotional and cognitive performance, as well as social behavior, in people, said lead author Yi-Yuan Tang, a professor in the Institute of Neuroinformatics and Laboratory for Body and Mind at Dalian University of Technology in Dalian, China. Tang currently is a visiting scholar at the University of Oregon, where he is working with Posner on a new and larger study to be conducted in the United States.

The current study did not include direct measures of brain changes, although previous studies have suggested alterations have occurred in brain networks. Posner said the planned studies in the United States will include functional magnetic resonance imaging to examine any brain network changes induced by training.

In summary, the 11-member team wrote: "IBMT is an easy, effective way for improvement in self-regulation in cognition, emotion and social behavior. Our study is consistent with the idea that attention, affective processes and the quality of moment-to-moment awareness are flexible skills that can be trained."

At this point, the findings suggest a measurable benefit that people could achieve through body-mind meditation, especially involving an effective training regimen, but larger studies are needed to fully test the findings of this small, short-term study, Posner said.

The project was supported by the grants from the National Natural Science Foundation of China, Ministry of Education of China and the UO's Brain, Biology and Machine Initiative.

Sources

Co-authors with Tang and Posner were: Yinghua Ma, Junhong Wang, Yaxin Fan, Shigang Feng, Qilin Lu, Qingbao Yu and Danni Sui, all of the Institute of Neuroinformatics and Laboratory for Body and Mind at Dalian University of Technology, Ming Fan of the Institute of Basic Medical Sciences in Beijing, and Mary K. Rothbart, professor emerita of psychology at the University of Oregon. Tang also is affiliated with the Key Laboratory for Mental Health and Center for Social & Organizational Behavior, both located in the Chinese Academy of Sciences in Beijing.

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