



Shamatha Project
Silent Practice Area
No Public Access



Project participants wear soft skullcaps with electrodes wired to an EEG machine to measure changes in their brain waves. The author is at the far right.

(Opposite) Shambhala Mountain Center in Red Feather Lakes, Colorado, where the Shamatha Project retreats were held.

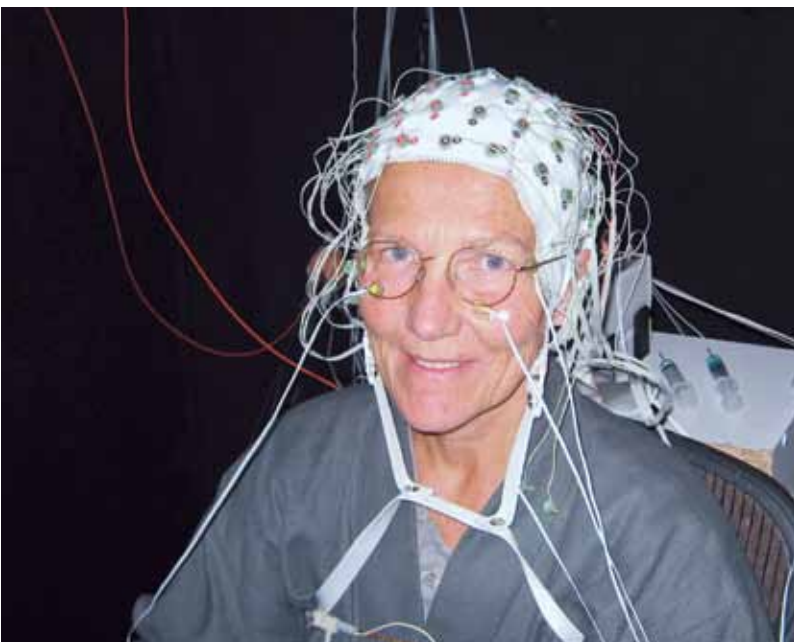
Inside the Shamatha Project

Adeline Van Waning, a psychiatrist and Buddhist practitioner, takes us inside a groundbreaking study that explores the effects of meditation on the brain and one's overall well-being.

When I first heard of the Shamatha Project, I felt like some of my deep longings were coming together. For quite some time I had wanted to participate in a meditation retreat that lasted several months. Combining this with cognitive and affective neuroscience and psychological research offered an extra dimension for me as a psychiatrist, and an opportunity to participate in contemplative history in the making. The ad said, “Meditate to advance science—be part of this groundbreaking neuroscience research project exploring the relationship between meditation and well-being.”

I was selected and in September of 2007 found myself sitting in a shrine room with twenty-nine others, surrounded by colorful thangkas. We were quickly immersed in Buddhist perspectives and meditation instructions from the Tibetan tradition, and within a few days we were also thrown into the language and agency of Western science—measuring our skin resistance and hormone levels, and meditating with EEG (electroencephalogram) caps on our heads.

The Shamatha Project included two three-month retreats, with state-of-the-art scientific measures, in a randomized wait-list control study. This meant that during the first retreat, while the research team studied the trainees, measurements were also done on the members of the control group, who were not meditating during this period. The members of the





control group became the trainees for the second retreat. I was in this group, with fifteen other women and fourteen men.

The ongoing project, a joint enterprise of the Santa Barbara Institute for Consciousness Studies, the University of California at Davis, and Shambhala Mountain Center, was initiated by B. Alan Wallace and Clifford Saron. Wallace, who lived as a Tibetan Buddhist monk for fourteen years and then studied physics and religious studies, was our meditation teacher. Saron, a neuroscientist at the UC Davis Center for

Mind and Brain, coordinated the research team, which consists of more than thirty interdisciplinary investigators.



ADELINE VAN WANING is a psychiatrist and Buddhist practitioner living in the Netherlands, where she leads shamatha classes for mental health professionals. She recently completed a master's degree in Buddhist Studies, writing her thesis on the Shamatha Project, and is currently working on a book about "settling the mind in its natural state."

SHAMATHA MEDITATION PRACTICES

Shamatha, referring to meditative quiescence, tranquillity, or calm meditation, is considered an indispensable foundation for the cultivation of contemplative insight, or *vipashyana*. Shamatha training cultivates relaxation, attentional stability, and vividness of perception, and can be done in structured ways that do not demand allegiance to any religious or philosophical beliefs. These practices therefore lend themselves well to scientific investigation.

The meditations we practiced were drawn from the Theravada and Mahayana traditions and involved directing the attention in three domains: mindfulness of the body, with various breathing meditations; "settling the mind in its natural state"; and "shamatha without a sign," or awareness of awareness. Summarized by Wallace as "soothing the body, settling the mind, and illuminating awareness," these practices were complemented with the four qualities of the heart (loving-kindness, compassion, empathetic joy, and equanimity), and tonglen, the Mahayana practice of giving and taking.

The retreats were at the remote Shambhala Mountain Center, which rests in a mountain valley of pine forests and alpine

(Opposite) The author meditates in the shrine room during the retreat.

The scientists hypothesized that three months of shamatha training, combined with cultivation of the four qualities of the heart, would result in improved attentional performance as well as greater compassion, security, and ability to regulate negative emotions.

meadows in the Colorado Rockies at an elevation of eight thousand feet. Founded by the late Chögyam Trungpa, it is part of the international network of Shambhala meditation centers now led by his son Sakyong Mipham. Summers are generally dry and sunny at this altitude, but temperatures may drop below freezing at any time of the year—and so they did while we were there, down to minus four Fahrenheit, producing sparkling rows of icicles hanging from the roofs.

Our building had a meditation hall and a room where we ate our meals, as well as two psychophysiology field labs, a gym, and a room used for daily yoga sessions led by one of the participants. No other people were allowed in the building, and everyone was committed to silence, which permeated the entire retreat center and program.

Meditation was our main daily activity, varying from five to ten hours a day for each participant, and it took place in different contexts. As a group we had two daily sessions with Alan Wallace: a thirty-minute session in the morning on the four qualities of the heart and tonglen, and, at 5 p.m., a thirty-minute practice period focusing on one of the shamatha attention meditations, followed by one hour of questions and answers, sharing, and dharma talk. I loved the contrast to silence that these lively and inspiring exchanges provided.

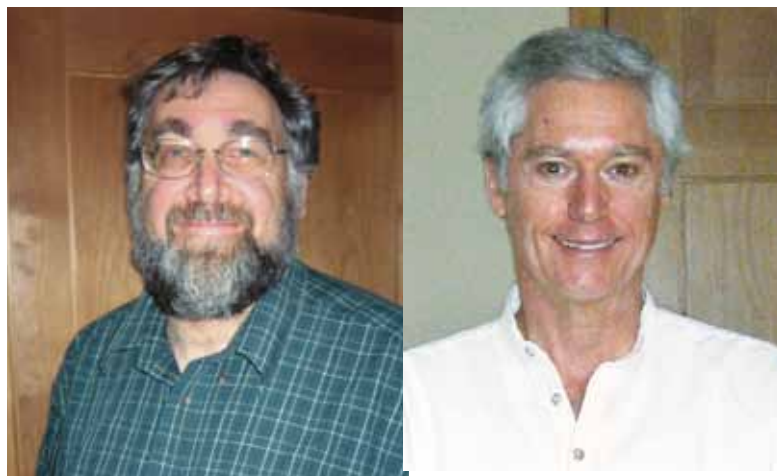
In the first few weeks Wallace gave guided meditations, rotating the practice every couple of days. For example, we were guided in breath meditations that focused on the tactile sensations of the breath in the whole body for two or three days, then two days with focus in the abdomen, followed by another two days with focus at the nostrils. Next we did two days of “settling the mind in its natural state,” then two days of awareness of awareness, and back to breath again. After a complete round, a new round followed. Later we practiced more in silence, without guided meditation. In addition, each of us had a weekly fifteen-minute interview with Wallace.

Most of us meditated in our rooms, though some shared a few sessions a day in the meditation hall. We took care of all the washing up and cleaning of the building in rotating



Participants gave ten vials of blood for research assessments at the start, middle, and end of their three-month retreat.

(L–R) Clifford Saron, coordinator of the research team, and B. Alan Wallace, the project meditation teacher.



work assignments. Going for a crisp walk over the Shambhala grounds, and hiking through the valley and surrounding mountains could be part of our program, and many of us did this every day. Another daily event was, in the evening, filling in the seven-page Daily Experience Questionnaire for the research. In this questionnaire, specially designed for this retreat, we logged forms and duration of meditation, health, moods and feelings, important experiences and insights, and dreams. This was quite a task, a daily awareness practice in itself.

COLLECTING THE SCIENTIFIC DATA

Neuroplasticity, the ability of the brain to form new connections between neurons, is astounding. Training in any field, such as music or sports, can significantly alter connections among neurons and modify the brain systems devoted to particular tasks. Recent studies are adding meditation to the list



Several of the participants shaving their heads at the beginning of their retreat.

Attaining shamatha is the most natural or settled that the human mind can become. It is said to lead to an experiential realization of the ground state of the psyche, referred to as the substrate, or storehouse consciousness.

of training techniques that can potentially change the brain in beneficial ways. While many meditation studies have been done with seasoned monks and nuns, the Shamatha Project is a significant addition to a growing number of studies on ordinary people who live active lives in society. The project is unique in that it uses an exceptionally broad range of measures.

The research questions for the project, outlined on the Santa Barbara Institute website, included the following: “What measurable changes in attentional ability occur as a function of intensive meditation training? What are the neural correlates of these changes and the range of their consequences? Is it true, as Buddhist contemplatives claim, that improvements in the voluntary control of attention and associated improvements in attention systems in the brain make it easier to recognize and overcome negative emotions, maintain resilience

in the face of stress, and improve relationships with other people? Do the changes persist after meditation trainees return from the retreat experience to the cacophony of everyday life in a modern society?” The scientists hypothesized that three months of shamatha training, combined with cultivation of the four qualities of the heart, would result in improved attentional performance (vigilance, selectivity, and meta-cognitive control), as well as greater compassion, security, and ability to better regulate negative emotions.

Measurements were done at the beginning, middle, and end of the three-month periods, each time for a period of two days. The study combined third-person research (looking at objective measures, from the outside) with first-person research (the way an individual subjectively experiences things as “I”). The second-person perspective (someone else’s view of the participant) was represented by Wallace’s impressions during his weekly interviews with each of us, as well as impressions of the video-interviewer. In addition, follow-up interviews with individuals close to the participants are planned.

Quantitative (third-person) measures of the project included well-known objective paradigms in cognitive and affective neuroscience, stress and affiliation-related biomarkers, EEG data, autonomic nervous system physiology, and the recording of facial expressions of emotion. We were also hooked up to the EEG machine when we meditated while listening to Wallace’s recorded instructions on breathing meditation, and when practicing compassion and loving-kindness meditation according to meditation research protocols.

Blood tests included hormone factors (like oxytocin, associated with social bonding and attachment) and cytokine IL-6, giving an indication of immune function. The stress hormone cortisol was obtained from saliva samples. Certain white blood cells were examined for telomerase, an enzyme essential for maintaining the ends of chromosomes so DNA replication can continue. From this research, scientists can investigate connections between molecular biology and psychology.

There were first-person components such as self-reporting, structured interviews, and daily journaling. First-person experiences for me included what it was like to be filling in lots of attention and psychology tests, letting myself be pierced for vials of blood, spitting saliva into tubes, discussing my personal experiences on video and audio, and in a diary.

The measures used were, in part, well-known mainstream tests, which made comparison with other research possible. But hardly any measures existed to address the potentially very refined attention that could be cultivated by participants in three months of intensive practice, so innovative tests had also been devised.

One example of an innovative attention test, done while we were hooked up to an EEG machine (with eighty-eight equidistant scalp electrodes) was the VCPT, or visual continuous performance task. The test, developed for this project, looked at directed and sustained attention. During the test, an elastic measuring belt was applied to the chest to assess breathing, and the distance to the computer screen was exactly recorded. Electrodes on the chest monitored heart rhythm and electrodes on the left hand measured skin resistance; a sensor on the index finger kept an eye on blood pressure.

The test involved seeing an alternately longer or shorter vertical line on the computer screen. At first the task was to click on the shorter one. After a few brief rounds the distinction between long and short got smaller, requiring us to sharpen our attention. I became aware of how I subtly stressed the muscles around my eyes and in my shoulders. Later, we were asked to click on the longer line, followed by another round of having to click on the shorter lines. Although we were told that this final round would last longer than the previous ones (it lasted more than half an hour), I found that by then I had lost sense of time. I also noticed that I got distracted more often.

HEALING THE MIND

Alongside this Western science, we were immersed in meditation practices. Wallace says two marvelous things take place in “settling the mind” meditation. First, you get to know your mind, the relative ground of your psyche. You have a front-row seat—welcome to yourself! Second, watching the innate healing capacity of your mind is a profoundly therapeutic process.

When guiding this practice, Wallace sometimes referred to his source texts by the nineteenth-century Dzogchen masters Lerab Lingpa and Dūdjom Lingpa. In the words of Lerab Lingpa: “Whenever you meditate, bear in mind the phrase ‘without distraction and without grasping’ and put this into practice.” When maintaining the mind in its natural state, Lerab Lingpa noted, there may arise sensations such as physical and mental well-being, a sense of lucid consciousness, and the appearance of empty forms. He advised that whatever kind of mental imagery occurred, one should just observe its nature.

Dūdjom Lingpa, in describing his students’ experiences, emphasized intense turbulences such as bodily pains,



Alan Wallace gives a dharma talk followed by discussion with the participants.

body–mind energy shifts, craving, compulsiveness, fear, anger, paranoia, and disorientation. He also described experiences of clarity, bliss, and nonconceptuality.

“The deeper you venture into the inner wilderness of the mind,” Wallace explained, “the more you encounter all kinds of unexpected and, at times, deeply troubling memories and impulses that manifest both psychologically and physically.” The motto is: use your discernment, and if necessary consult with your teacher. Also, if needed, seek medical help. For long-term intensive meditation practice one needs some initial inner stability and groundedness. At the same time, with the shamatha practices one is also cultivating stability. With unfamiliar meditation experiences the initial advice is to just “watch your mind heal.”

For me, this practice of neither grasping at thoughts nor banishing them brings a sense of greater familiarity with mind and its contents, and a melting, not only of old neurotic knots, but of the habitual, familiar sense of separate self. By just observing, familiar identifications are released, and with that comes the realization that there is only an impermanent, ever-changing flux of perceptions and reactions, hopes and fears, thoughts and emotions, habits and motivations, which we project onto the external world. This melting away of a sense of separate self can create anxiety and grasping identification,



Participants climb the steps to the Great Stupa of Dharmakaya at Shambhala Mountain Center.

particularly for Westerners who are conditioned to think of themselves as separate individuals.

The practice of settling the mind also hones the ability to observe and tolerate anxieties—to see mental objects for what they are, without needing to grasp and identify with them. With the melting of habitual conditionings, I could be witness many times to a kind of dissolving and re-arising of self-consciousness, to a loosening of my old self, and to coming back, slightly new.

The cultivation of shamatha is said to lead to an experiential realization of the ground state of the psyche, referred to as the substrate, or storehouse consciousness. Contemplatives who say they have realized the substrate consciousness report that it is imbued with three qualities: bliss, luminosity, and nonconceptuality. Although most of us still have a long way to go in deepening our realization, we may experience glimpses of these qualities.

Attaining shamatha is said to be the most natural or settled that the human mind can become. This emerges after going through the various turbulences—and in some sense having worked through them—with a mind that is more and more serene, and has great suppleness and pliancy. While this is

described as a great shift in experience, teachers emphasize that students should not mistake realizing this relative ground of the psyche for realizing the ultimate nature of reality, for which contemplative insight is required.

HEADING HOME

During the last few days of the retreat we gradually prepared for our return to the “cacophony of everyday life” with more talking and exchanges. I was impressed at how in silence we had developed specific “languages” in which friendship could flourish.

These were also the days when researchers and participants shared their excitement, relief, and curiosity. In our final meeting with the science team members there was a sense of climax as they explained the setup and the how’s and why’s of the measurements, and we could at last get answers to our questions.

In addition to the technicalities, we were told that the real assessment of what this retreat brought us would ultimately be reflected in the rest of our lives.

Five months after finishing the retreat each participant received a laptop at home in order to do follow-up measurements, repeating a number of the assessments we had done during retreat. We were sent a laptop again around the eighteen-month mark for another round of follow-up testing.

Since the retreat, fourteen of the seventy participants from the two groups have continued full-time shamatha, ranging from several months to a year immediately after the Shamatha Project retreat, and nine of the project participants are now in full-time retreat. Most of us have continued shamatha meditations at home, albeit for fewer hours a day than during retreat.

THE FINDINGS

What will come out of this huge collection of data and research? Some results have been published, and many reports are being prepared that will be presented in coming months and years. So far, the findings demonstrate wide-ranging benefits of the retreat experience for participants. Clifford Saron, the neuroscientist who led the Shamatha Project research team, reported to the Dalai Lama in 2009 during the eighteenth Mind and Life conference that initial findings demonstrated improvements in our adaptive psychological qualities, perceptual and attention-related skills, improvements in inhibiting our habitual responses, and decreased mind-wandering. Also, changes in the emotional response to the perception of human suffering were found, as well as changes in biomarkers associated with cellular repair. Psychological self-reporting (first-person view), according to Saron's findings, indicated that intensive meditation training had enhanced our mindfulness, ego resiliency, empathy, openness to experience, conscientiousness, and psychological well-being, while reducing our attachment-related avoidance, general anxiety and neuroticism, and difficulties in regulating emotions. Further data analyses will make clear how these subjective self-reported improvements relate with objective indicators of attention and health-related physiology.

According to Wallace, "Although only a fraction of the terabytes of data gathered in this study has been analyzed, there is clear evidence that this three-month training resulted in a decrease in afflictive attachment, anxiety, difficulties in emotion regulation, and neuroticism, and an increase in mindfulness, conscientiousness, empathic concern, dispositional positive emotions, and general well-being."

A number of articles on findings from the research have

recently been published in international journals, and a lot is in the pipeline. Results of the VCPT lines test indicate that meditation training produced improvements in visual discrimination that were linked to increases in perceptual sensitivity and improved vigilance during sustained visual attention. A 2010 report by Katherine MacLean, lead author for this research, suggests that perceptual improvements can facilitate the sustaining of voluntary attention. And the post-doctoral scholar Tonya Jacobs was lead author on an article published

last year that linked, for the first time, meditation and positive psychological change with telomerase activity. The data shows that telomerase activity was significantly greater in retreat participants than in controls at the end of the retreat—this coincided with a decrease in measurements of neuroticism, and increases in measures of mindfulness, purpose in life, and "perceived control." Another study, published this year by lead author Baljinder Sahdra, showed that participants became better at "response inhibition." This kind of restraint seems to be an important factor in healthy emotion regulation. Improvements in this ability were linked to better adap-

tive psychological function that participants reported over the course of the training.

The Shamatha Project has become an internationally influential study, and its findings will contribute to fine-tuning and focusing future projects. Shamatha research is continuing at a contemplative training facility Wallace has established in Thailand at the Phuket International Academy, and he is in the process of creating multiple "contemplative observatories" around the world where people can meditate for months or years on end. Meanwhile, Saron and his team remain dedicated to understanding from an interdisciplinary perspective the dimensions of change the project has chronicled and how the experience has affected the participants over the past three years, a daunting task scientifically and in terms of funding.

Looking back, these have been very special months in my life, and I'm deeply grateful to those who made it possible. Experiencing the "suchness of being" in meditation while simultaneously being "measured through" was a great gift—there was no place to hide, nothing to win or lose; all I could do was just be. From a purely contemplative perspective, the measurements created some distraction. However, it's gratifying to know that the experience was part of a broader engagement that may have important consequences for meditators, and for our understanding of the role of meditation in one's overall health and well-being. **BD**

