

# The neural effects of Peter Hess ® sound massage

by Dr Kerstin Gommel PhD

The sound massage developed 25 years ago by Peter Hess, is still constantly evolving with countless observations of practitioners and clients continuously flowing in. The question presented in 2009 pilot study on neural effects of the sound massage was:

- Can the subjective effects of sound massage be objectified by measurement?
- What are the appropriate methods of measurement?
- What are the effects of sound massage?

## In search of suitable measurement methods:

At the Institute for Communication and Brain Research in Stuttgart-Feuerbach (Germany\*) the emphasis for over 20 years was placed on learning and promoting research on cerebral damage . The institute is visited by especially children with learning disabilities, adults with concentration problems or desire to improve performance, for example in management or professional sports, to people with cerebral lesions. There is a focus on investigation into the effects and therapeutic use of music, especially the music of Mozart.

## Measuring methods:

- EEG spectral analysis: Developed by Günter Haffelder from the Institute for Communication and Brain Research, EEG spectral analysis is a standardized measurement method, in which more than one 2 - channel dispersion of brain waves are derived. The EEG signals with their spectral analysis of their individual frequency components are separated and calculated in 3 dimensions over time in a chronospektrogram. Two chronospektrograms of the same person, for example recorded before and after an intensive week of sound massage training, can be compared and possible changes are documented in brain-wave image. The software also allows a challenge of increasing per-second time windows in chronospektrogram. Based on the measurement protocol the direct reactions in the brain image stream, for example, in individual sessions during a singing bowl sound massage accompanied by measurement, can be traced and investigated.
- At the points used in the measurement (at the mastoid, i.e. directly behind the ears, and forehead) there are mainly signals recorded from the midbrain, the frontal lobes and the temporal lobe. Thus, they come in part from the auditory cortex as well as from the limbic system.

The limbic system, associated with among other things with the hippocampus and amygdala is regarded as a major hub for the processing of emotions and body sensations such as pain. It also plays an important role in learning and memory.

The typical frequency of the EEG spectral analysis, according to Haffelder shows a test subjects at rest in a rather low beta activity, theta and particularly delta, however, can have relatively high amplitudes, alpha is typically associated only with closed eyes.

The frequencies of the human brain (according to G. Haffelder):

Beta rhythm ( $\approx 14 - 28$  Hz):

Logical thinking, active attention, but also aggression, stress and frustration.

Alpha rhythm ( $\approx 7-14$  Hz):

Relaxed concentration, calm and serene mind. Alpha is the "bridge" between the conscious and subconscious.

Theta rhythm ( $\approx 3.5$  to  $7$  Hz):

Quiet, sleep, dream and inspiration, visualize, daydream, fantasize.

Delta rhythm ( $\approx 0.1$  to  $3.5$  Hz):

Cerebrum: Dreamless, deep sleep, trance, hypnosis. Midbrain: personal radar instinct, "6th sense".

### **Measurement of visual and auditory order threshold:**

In an attempt to record at all comparable brainwave signals, it is important to deal with the test subjects in the same way. For this purpose, for example, the order threshold test may be suitable.

When two sensory stimuli, for example in visual or audible form (e.g., two flashing lights or two sounds), are offered to a test subject in a quick succession, and when the time distance between the two stimuli is being reduced, there is a moment when the distinction, which stimulus occurred first is impossible for the test subject to determine. The time period in which an adult is able to usually detect two stimuli and correctly associate with time, is about 50 to 100 milliseconds.

In the measurement of the (supply) order threshold, there is an information about the stimulus processing speed of the brain. In the study the threshold test order was used to focus the trial participants, possible results of the tests were only of secondary interest.

### **Study Design:**

- Subjects:

The experimental group consisted of 15 participants in an intensive training for therapists at the Sound Academy Rhon, the control group consisted of five employees of the seminar center, who did not participate directly in the Intensive Course but were in the normal working day. Educational attainment, median age and gender distribution of the two groups were comparable. For re-measurement after a hundred days there were still 10 participants in the experimental group and 4 in the control group available, also in similar sex ratio.

- Timing:

The brain waves were derived with the test subjects and the visual and auditory order threshold test was performed at the beginning and the end of the intensive training week, which included more than one daily workshop and individual work with singing bowls. The order threshold test was measured again after 100 days as part of a supervision weekend for the students, and the questionnaire data was also collected in this context. The questionnaire covered subjective assessment of personal stress levels during the study period and its possible background, as well as the number of sound massages contacts in everyday life. Random samples of the brain waves of individual test subjects were also taken, recorded and investigated during a sound massage in the study period.

### **The effect of sound massage?**

Study Results and discussion:

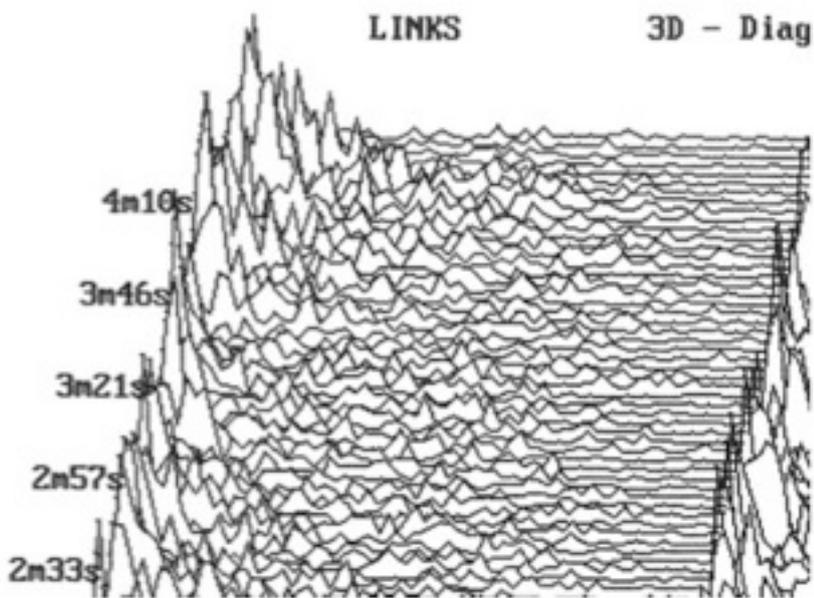
- EEG spectral analysis:

In general, the rhythm of brain processes was observed in the trial participants. The beta activity of the test participants was significantly lower after the intensive sound week. This was a visible reduction of stress. In the control group, however, the beta activity increased at the end of the normal work week. The alpha activity increased in the experimental group, blockade decreased. A significant portion of the test subjects also showed a synchronous brain activity after the week of sound, indicating a better cooperation between the hemispheres. The theta-activations were not significant, however, both in the experimental and in the control group. This can be explained by the experimental arrangement employed as the test subjects concentrate during the entire EEG

measurement with the threshold test, had little room to give rise to mental images. For the individual measurements during the implementation of a sound massage, however significant theta pattern occurred (see below).

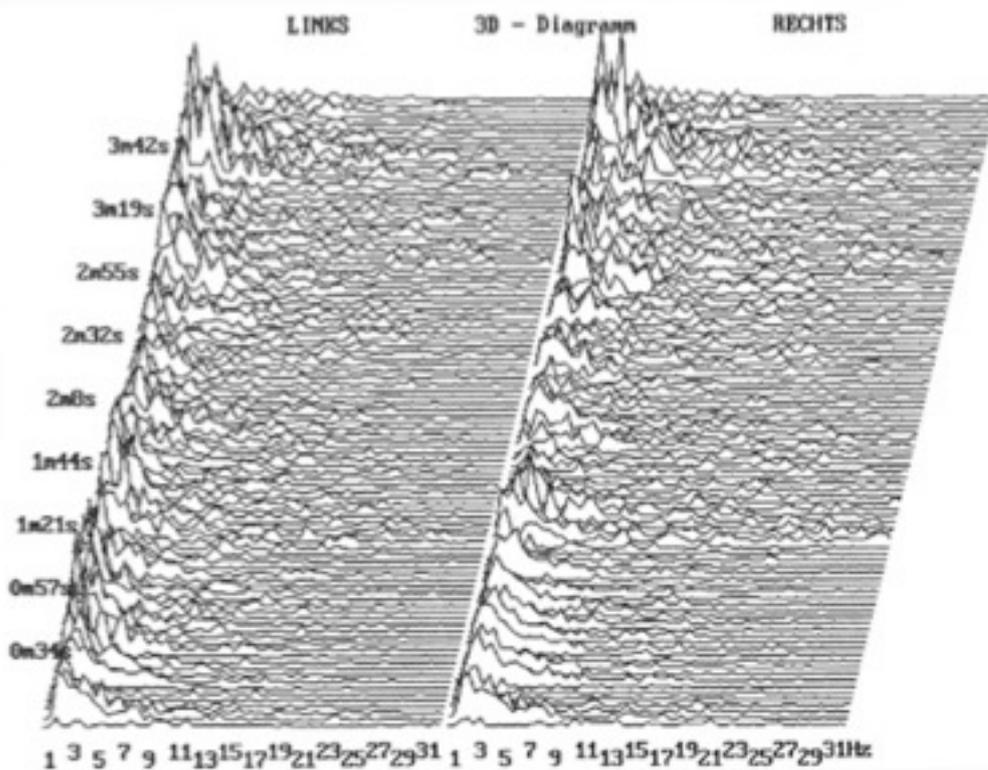
In the area of the delta rhythm, a distinct rhythmic and regular pulsing was found in a significant proportion of the participants after the sound week, the brain halves of the test subjects worked significantly more symmetrical. Subjects of the control group showed no changes after the end of the workweek, but in contrast a slight increase in asymmetry in

brain hemispheres in the lower frequency range and a decrease in delta amplitude.



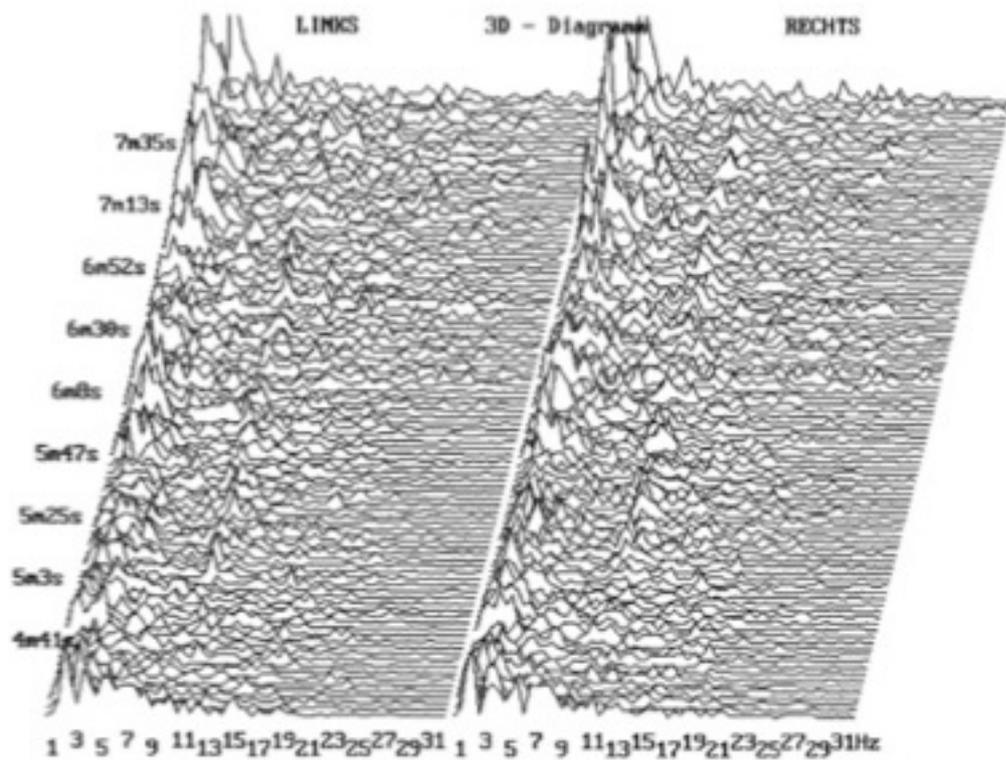
**Diagram 1**

Chronospektrogram EEG spectral analysis of the test subject 9 on day 1 of the study, recorded during the implementation of visual perceptual tests. This shows above all a strong stress in the beta range.



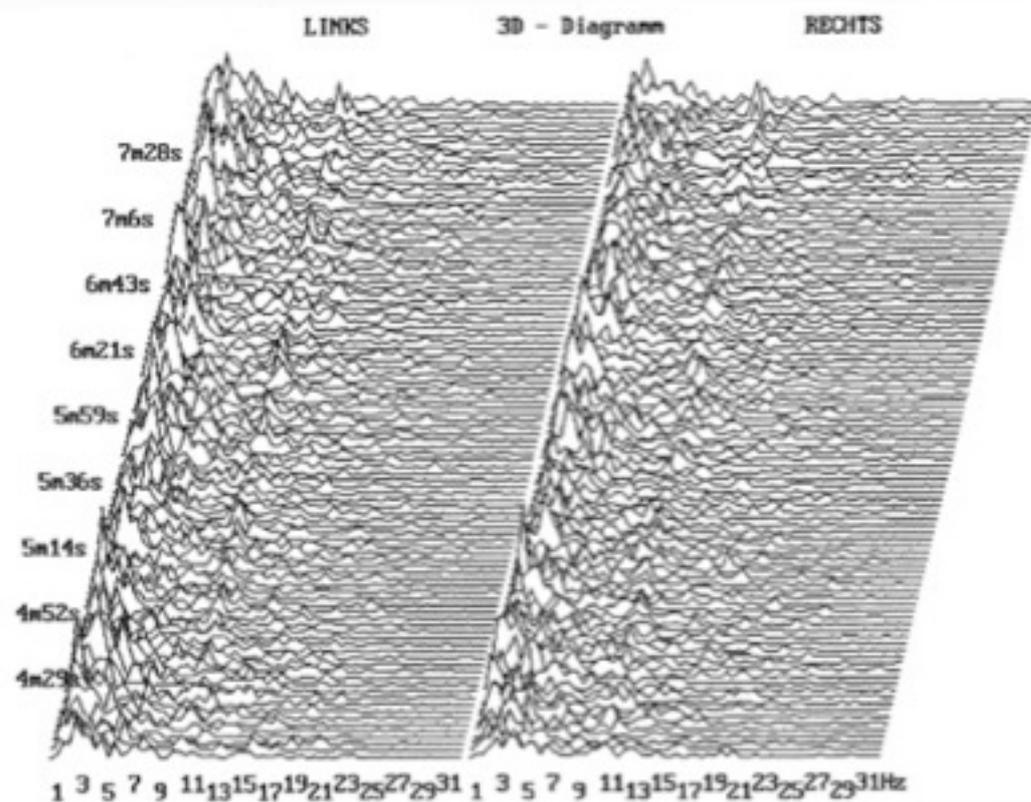
**Diagram 2**

Subject 9 in the same experimental setting, after a week in the "sound space". The beta activity, i.e., the stress level has decreased significantly. In the low frequency range reveals a rhythm and relaxation, especially in the right hemisphere. The subject is reinforced in a state of inner perception.



**Diagram 3**

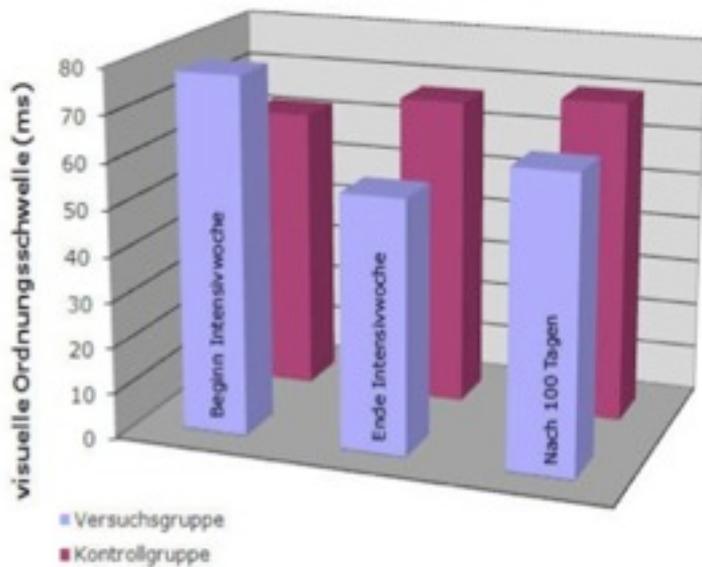
Test subject 9 during the implementation of the auditory perception tests on Day 1 High beta activity, isolated alpha activity. At the alpha activity is to read that the test subject's eyes are closed, because the human brain, as mentioned above, can normally vibrate only with closed eyes in the Alpha.



**Diagram 4**

The comparison chart to image 3 of test subject 9 directly to the sound-week intensive. Here, in addition to the decrease of beta activity above well structured and visible increase in alpha activity.

### Visual Order Threshold averages



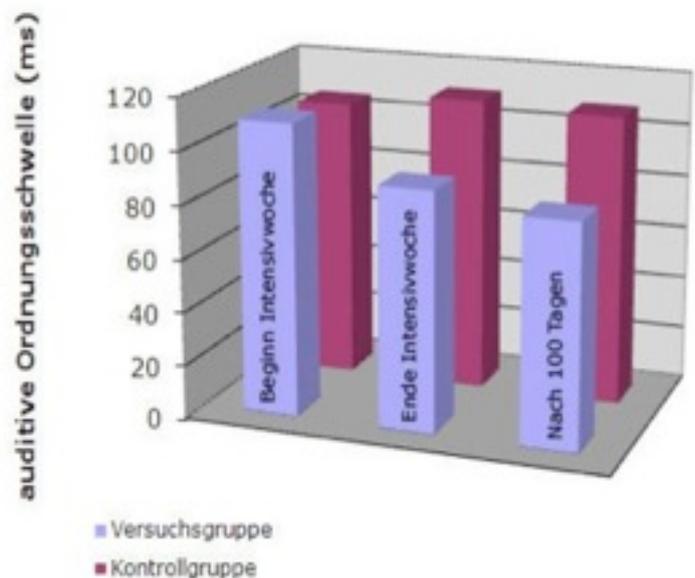
### Order threshold measurement:

The implementation of the regulatory threshold tests produced some results: In the field of visual order, in the experimental group a significant increase in perception was detectable after the intensive week. After one hundred days the value had decreased slightly and leveled off again about halfway between the baseline and the value immediately after the end of the sound week. In the control group, the visual order threshold remained largely

unchanged and even increased slightly.

The order threshold experimental group showed a stabilization after 100 days of the sound week observable performance increase. In the control group, however, there were no significant changes. Thus, the measurement of order was emerging as a possible parameter to document an increased stress levels, also the results of the control group indicate that a "practice effect" may be excluded.

### Auditory Order Threshold averages



### **Collected results of the questionnaire:**

The mean stress level of the test participants was on a scale from 1 (very low) to 6 (very high) on average at 4.25 before and 1.55 points given immediately after the week of sound. After 100 days, the mean of subjective assessment of stress was 3.35 points. Stress causes were equally in the auditory both in the professional as well as private sectors. The number of sound contacts was not in correlation with personally observed long-term effect after the sound week. Half of the test subjects observed in approximately a week after the sound week, lasting change in the stress level, the other half for several weeks, two test subjects are presented with persistent changes at the 100th day of the survey day in the questionnaire set.

### **EEG measurements during a sound massage:**

In the random EEG measurements during the test subjects showed measurable responses to a sound massage single strokes. With the belly bowl on the middle back, one test subject could relax deeply. The Universal bowl on the soles of the feet brought a similar effect, which was evident in the strong right brain delta and theta activation. When the heart bowl was in the thoracic spine area, the subject was awake and "counted" in the left hemisphere with the beats.

The hemisphere model:

Right and left brain hemispheres have different functions in humans and different ways of working. In right-handers, the left hemisphere is responsible for the conscious processes, it is linear and logical. Created here are the self-awareness and for example the ability to rearrange themselves and the environment in the time stream to find words for something and talk. The right brain operates holistically, however, It is timeless and pictorial, and contains the intuitive, creative, body-oriented and generally unconscious processes.

The test subject showed especially significant delta activation in direct interventions by the therapist. So they reacted strongly to any measurable kinesthetic stimuli, e.g. hand touch of therapist before setting up the bowls on the body of the test subject.

### **Subjective and objective effects of sound massage.**

A summary:

Getting a massage is an experience in sound. The sounds and vibrations of the singing bowls touch people deeply on multiple levels, physically, emotionally and spiritually. Subjectively decrease the level of stress and good unwind and relax are possible. The conducted study, further investigations will follow, could show that there are objectified neural effects of a sound massage, displayed lasting changes on an image and also in measured brain current speed at a changed perception of the test subjects. These first measurements also showed a strong influence of the one who gives the sound massage, the person who receives it. The sound massage makes people "very open" to all contacts and interventions by the therapist. These results should be included in the education and training and suggestion may be different for individuals who work with the sound massage, to train more and more towards intuition and mindfulness.

### **Literature:**

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During a medical mission in Nepal in the winter of 2008/2009 she met Peter Hess, in Bhaktapur. There came the idea for this research. [kegommel@yahoo.com](mailto:kegommel@yahoo.com)