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Psychophysiology Today

The mind body magazine

Demonstration of Sufi Voluntary Control

Participants experienced no pain, bleeding or infections while being pierced with unsterilized skewers.

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FROM THE EDITOR

Work is love made visible… This Quote from Kahlil Gibran should come into our minds every so often. In these busy and accelerating times we may forget to focus on the real sense of what we are doing. No matter what we are doing, work is life but life is not work but play. A play that may be expressed by our innate love. Our love and thankfulness for the gifts we were given, to the world, the creatures…

Deep inside our hearts there is this wish to express ourselves, to be creative, to explore and then share it with others.

Problems at worksites are dramatically increasing and Burn Out is becoming epidemic. Many people lose the sense that what they produce may be valuable for them and for others. Having to work feels like a burden that fills almost the whole day and changes the mood for the worse, while not having an occupation is an equally existential threat.

There may not be too many, but an increasing number of people are lucky enough to earn their money with what they love to do. Biofeedback therapists may belong to this lucky group, and I am one of them. Lucky for me, even after 15 years of doing this work, I get up every morning with excitement for the day. After searching years for what is really my passion and getting educated in so many different areas of holistic health, I found the missing link with Biofeedback, and this was and is still is IT. Think outside the box and be surprised by what you may find. There is still so much to explore, and this journal will offer you ideas of people as curious as me who never stop exploring and expressing their love of their work. Erik Peper is one of these who never stops and continues to contribute to the understanding of holistic health by exploring Yogis and this time Shamans in Jordan.

Enjoy this journal and let yourself be inspired…who knows what will follow?

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PRESIDENTIAL NOTE

A time of transition; a time of change from BFE to BFE

As many of you know the Biofeedback Foundation of Europe has gone through a number of changes since the 15th annual meeting in Munich. We've moved our head office from the Netherlands to England, where we maintain our non-profit status as a community interest company. The move required us to change our name from the Biofeedback Foundation of Europe to the Biofeedback Federation CIC. For simplicity and convenience the BFE now stands for Biofeedback Federation in England. During this transition the BFE acronym stayed the same, the members of the advisory board have not changed and our mission is exactly what it has always been: To nurture the development of the field of applied psychophysiology and biofeedback.

In the introduction to this issue of Psychophysiology Today, Monika Fuhs, the Editor in Chief highlights the love and the passion that we all share for biofeedback. Ralph Sztembis, MD, will be the co-host of this year's 16th meeting. This new location fulfills the BFE's mission to support, nurture and help expand the field of biofeedback in different communities. The power and tragedies of 20th century history in Poland make us only more aware of the need for inspiration and hard work.

The choice of Poland as the location for the 16th meeting was not only because of the Union of European Football Associations 2012 Championship Soccer (Football) being held in Poland and the Ukraine. Because of the tremendously rich history and culture that will surround the meeting location in Rzeszow. I invite you all to attend and participate this September's BFE meeting as it is an opportunity for formal and informal collegial sharing. It is an opportunity to hear about new research and clinical findings from international faculty within an interdisciplinary context.

This year's meeting will once again have one and two day workshops and a scientific session. The topics will range from treating pelvic floor pain and sexual dysfunction to the treatment of attention deficit disorders. The presentations and symposia of the scientific session will explore the limits of physiological control of pain and bleeding. We hope to include a psychophysiological study and demonstration of pain control by Sufis who will insert and remove unsterilized skewers and knives into and through numerous parts of their body without experiencing bleeding, infections or pain. I was very fortunate to be invited by Sheikh Mohammed Abdul Kareem Kasnazani to observe and experience these demonstrations as shown on the cover of this issue. This is just one of the numerous presentations being organized for the meeting. I invite you to submit new findings as there will be a poster session and oral session for late submissions. And, if your institution is interested in hosting and co-sponsoring the next meetings of the BFE, please contact me.

I look forward to seeing you at the 16th annual meeting of the BFE in Rzeszow, Poland.

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Is the Effectiveness of Biofeedback Training Primarily due to Its Being a Form of Hypnotic Induction?

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As I see it, the reason biofeedback has proven to be so effective for gaining control of involuntary physiological responses is that in actuality subjects going through biofeedback training are being put through a form of hypnotic induction. To fully understand the basis of this contention one has to be aware of my definition of hypnotic induction and hypnosis as presented in my theory of hypnosis. In the theory a hypnotic induction is defined as the giving of two or more suggestions in succession so that a positive response to one increases the probability of responding to the next one (Barrios, 2001, p. 171). The reason for this is that as a result of the positive response to the first suggestion, the belief factor is increased thus producing the beginnings of a state of hypnosis, which in the theory I define as a state of heightened belief. And I am not alone in this line of thinking. As you can see in the following quote from Skinner's Verbal Behavior (1957, pp. 160 & 357), he presents the same basic idea:

"Our belief in what someone tells us is similarly a function of or identical with our tendency to act upon the verbal stimuli which he provides. If we have always been successful when responding with respect to his verbal behavior, our belief will be strong... Various devices used professionally to increase the belief of the listener (for example by salesmen or therapists) can be analyzed in these terms. The therapist may begin with a number of statements which are so obviously true that the listener's behavior is strongly reinforced. Later a strong reaction is obtained to statements which would otherwise have led to little or no response. Hypnosis is not at the moment very well understood, but it seems to exemplify a heightened belief in the present sense. The world for a time is reduced to verbal stimuli which are in practically complete control of the hypnotized subject."

And the last sentence in this quote leads to my explanation of why it is that a heightened state of belief leads to greater control over involuntary responses. In my book, Towards Greater Freedom and Happiness, I define belief as "focusing on a thought to exclusion of anything that would contradict it". Thus the reason for one having greater control over involuntary responses via hypnosis and biofeedback is because the inhibitory set aspect of belief blocks out any interference from competing stimuli in what I refer to as the stimulus dominance hierarchy (Barrios, 2009, p. 17). At any one point in time there are any number of stimuli present (both cognitive and sensory) that compete for one's responding. If we want someone to, let's say, respond strongly to a suggestion or thought (a cognitive stimulus) of relaxation, we need to first block out interference from any competing, more dominant stimuli in the hierarchy.

It should also be made clear why it is that biofeedback devices increase the chances of the subject seeing a positive response to a suggestion. It is because these devices amplify any initial minute responses to suggestion.

Although the use of biofeedback devices has only been around since the early 1970's, the basic principle behind biofeedback has been used to facilitate hypnotic inductions long before if we can look upon the Chevreul Pendulum as a hypnotic aid device; for if you stop to think about it, the Chevreul Pendulum is in actuality a biofeedback device. What the pendulum does is amplify minute ideomotor movements of the hand when the thought of a particular movement is suggested (e.g., suggestions that the pendulum will swing from left to right. or in a circle, or back and forth). Many in the field of hypnosis recommend use of the Chevreul Pendulum as a "warm up" procedure to get subjects in a more receptive mood for hypnosis (e.g., see Lynn and Sherman, 2000: p. 202). In fact a complete hypnotic induction procedure, starting with suggestions of movements of the pendulum has been devised (see the Pendulum Technique in Barrios, 1985: pp. 36-38).

The following studies provide further support for the contention that biofeedback devices enhance responsiveness to hypnotic induction:

Wickramasekera (1973) using forms A and B of the Stanford Hypnotic Susceptibility Scale found a significant increase (p=.001) in suggestibility upon using EMG biofeedback to reinforce suggestions of relaxation.
Dikel and Olness (1980) compared three groups for effectiveness in raising and lowering fingertip temperature: Group A - self-hypnosis alone. Group B - self-hypnosis with biofeedback. Group C - biofeedback alone. Among other things, they found that "Some of the children in Group A who had little or no success with hypnosis only were very successful with the addition of biofeedback monitoring, suggesting a synergistic effect between biofeedback and hypnosis".
Elton (1993) compared two groups of 20 subjects each being treated for stress and tension headaches. "In this study the use of hypnosis is compared with the use of hypnosis plus EMG biofeedback in the framework of behavioral therapy... The results indicated that both groups showed significant gains, but the hypnosis and biofeedback group showed better results and reported that they found it easier to accept hypnotic training and self-regulation".
Somer (1995) found that using biofeedback to enhance the hypnotherapeutic treatment was effective because of the "continuous convincing feedback about the growing mastery" provided by the biofeedback.

Discussion
It is hoped that by pointing out that biofeedback training and hypnotic induction are very closely related if not equivalent, people in one field can now begin to profit from the techniques used in the other. Not only can hypnotherapists enhance the effectiveness of their hypnotic inductions with the help of biofeedback devices, but biofeedback therapists can increase their success rate with their patients by using some of the techniques that have proven successful in hypnotherapy.

For example, in my use of hypnotic induction I have for years used a thermal biofeedback device, my invention the Stress Control Biofeedback Card (Barrios, 1983), to reinforce suggestions of relaxation and thus increase the effectiveness of hypnotic induction in helping clients gain control over stress. And as an example of how techniques of hypnotherapists can help biofeedback therapists, I have developed (thanks to my theory of hypnosis) a number of techniques for enhancing post-hypnotic

suggestions which can be used by biofeedback therapists to enhance post-biofeedback-training results. This includes a variety of visualization techniques for ensuring that suggestions of greater control in a number of typical situations will hold long after the hypnotic induction (Barrios, 1985: pp. 213-250). It also includes the giving of post-hypnotic suggestions that will further enhance achieving the goals of the therapy. For example, for the goal of stress control, post-hypnotic suggestions are given using the conveniently portable Stress Control Biofeedback Card to lower the stress level any time during the day whenever stress rears its ugly head. (There are four relaxation techniques on the back of the card that the client can use to raise the fingertip temperature). Also, suggestions are given for installing positive mental attitudes (e.g., looking for the good in others; looking for the "silver lining" in bad situations; learning from your mistakes, etc.) that will ensure a lower level of overall stress (Barrios, 1985: pp. 58-71; and Barrios, 2009: p. 64).

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The Added Value of Psychophysiological Stress Profiling

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Introduction

Many people visit their general practitioner because of fatigue and pain. If a medical cause is suspected, the patient is referred to the hospital and when a medical explanation cannot be found, the patient will be referred to a psychologist with the label "stress related problems". The psychologist will look at cognition, behavior and personality, and start a therapy hoping that the symptoms disappear spontaneously as the patient learns to cope better with problems and personal pitfalls. Sometimes that happens, but often the problems remain, especially when the patient is challenged in therapy to experiment with new behavior, which causes extra stress. Part of the therapy will probably be relaxation in some form. My experience, however, is that a large percentage of patients do not profit very much from relaxation exercises. An explanation can be that relaxation exercises are given without really knowing what is going on in the body of the patient. So it can happen that a patient with a normal breathing pattern gets the advice to do daily breathing exercises and that a patient with a disturbed breathing pattern gets the advice to try progressive relaxation of the muscles. Wouldn't it be better for patients with stress related complaints if the therapist and patient are able to see clearly how the body reacts during relaxation and during stress? That is, what psychophysiological stress profiling is about. By measuring body functions, like respiration, heart rate, muscle tension, hand temperature and galvanic skin conductance, the therapist gets a clear view of the way the body responds to stress and he sees whether the patient is able to relax when the stress is no longer there. Moreover, the therapist can really test the efficacy of a relaxation exercise, so he can give better advice about which relaxation exercise is best for his patient. Stress profiling makes it possible for the patient to understand his or her complaint and gives the therapist a tool to determine what kind of therapy is needed to tackle the stress related problem. In this article I show the added value of psychophysiological stress profile by means of two case studies.

Health and inner balance

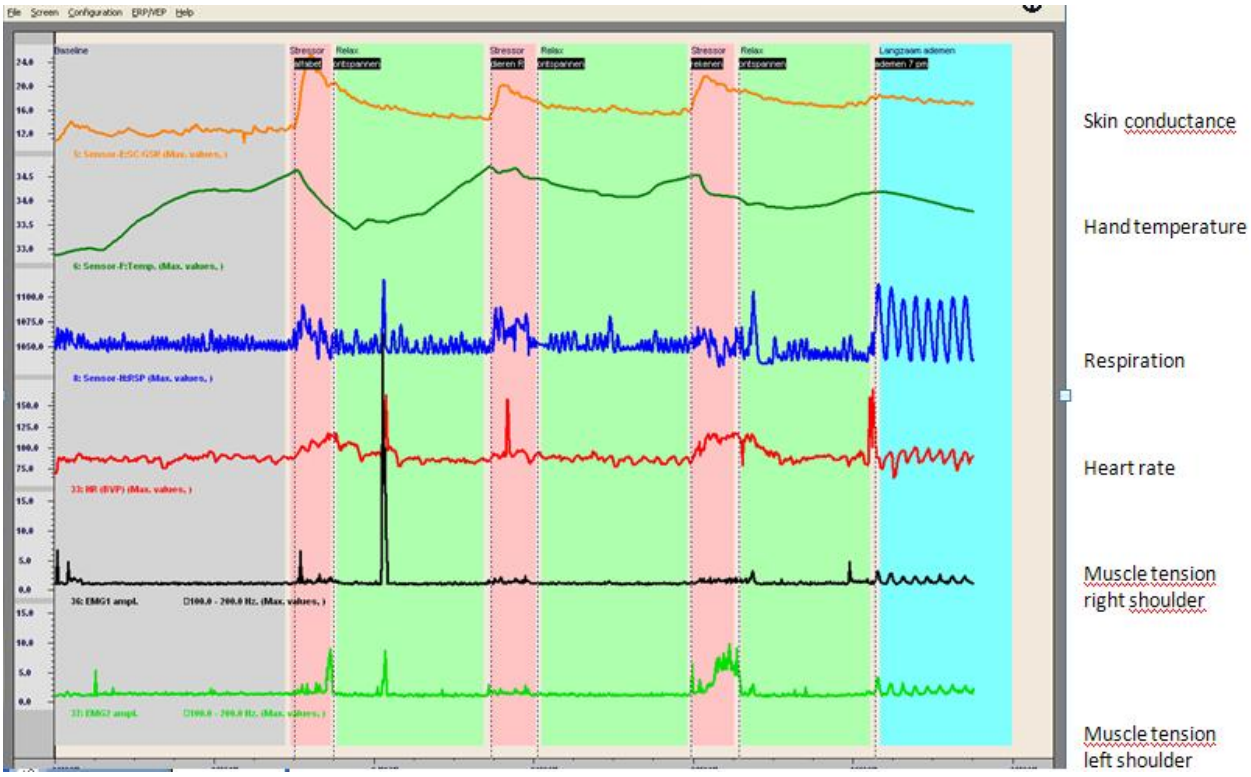
Health is all about balance. The brain, the nervous system and the heart all work together continuously to maintain body balance. If action is required by the body, these systems make sure that the body can act in the appropriate way. During this active or alert state, processes of growth and recovery, such as digestion and the immune system are put on hold. This not only happens during physical activity, but also during mental effort and during the experience of danger or threat, for example in stressful situations or insecure environments. It is no problem to be in a state of alertness or activity for some time, but eventually the nervous system has to return to a more relaxed state to offer the body the chance to regenerate. Stress related problems occur when the body is too long or too often in an active or alert state, while there is not enough time to relax and to regenerate.

The psychophysiological stress profile

If we are in a relaxed state, respiration is slow and deep, heart rate is normal, muscles of neck and shoulder are relaxed and the hands are warm and dry. When we are in a state of alertness or activity a change in these signals can be observed. This change varies within people. When a person is challenged with a mental task, for example a difficult math task, some people start to sweat, others tense their muscles and yet another group of people will start to breathe more rapidly and shallowly. It is important to know how a patient reacts to a mental task, as this would probably be the same as the stress reaction that he will show in other stressful situations in his daily life. In my practice I use a standardized stress profile, measuring muscle tension in both trapezius muscles, respiration, heart rate, hand temperature and skin conductance. The test starts with a baseline of 6 minutes, in which the patient is reading in silence. This is to avoid that the patient is too much occupied with relaxing. Then periods of relaxation, marked green in the graphs, are alternated with mental stressors, marked red in the graphs. The test ends with a particular breathing exercise, which is slow breathing at a rate of 5-8 breaths per minute, depending on the normal breathing rate of the person. The stressors used are mental stressors, in the following order: 1) saying the alphabet backwards out loud, 2) think of as much animals starting with the letter R and 3) serial sevens math task. As you will see from the following case studies, this 20 minute stress profile offers a lot of valuable information for both client and therapist.

Case study: Headache

Mr. W., age 33, had been referred to my psychology practice because of headache, caused by a combination of stress and too much tension in the muscles of his head and shoulders according to his general practitioner. Mr. W. has had a stressful time with a lot of private and work related stressors. This was at the time of onset of his headache about 3 years ago. At the moment, he leads a quiet and non stressful life, but his headache has not disappeared, although the pain is less intense. The stress profile is conducted in the standardized way as described above in this article. See picture 1.



Picture 1: Stress profile of Mr. W. Most remarkable is the reactive skin conductance. Grey segment is baseline while reading, red segments are the stressors, green segments are the periods of relaxation and the blue segment is the breathing exercise.

The stress profile shows that Mr. W. had relaxed shoulder muscles during almost the whole test. Apart from the muscle tension in the shoulders, I tested as a separate measurement the muscle tension in the masseter, frontalis and neck, but also these muscles appeared to be relaxed. Most certainly the cause of the headache could not be found in high muscle tension, as the general practitioner had suggested.

The stress profile however does show that the skin conductance does not show normal values. Skin conductance is a measure of reaction/emotion. An emotional reaction creates additional perspiration on the fingertips, making the skin conductance increase. The expected pattern is an increase in skin conductance during a mental task and a decrease in skin conductance during relaxation and recovery from the mental task. The skin conductance of Mr. W. was extremely high, about 12 micro Siemens, instead of the normal value of about 0-3 micro Siemens. The skin conductance also shows continuous activity, even when the room was silent during the relaxation periods. It looks like he was reacting all the time, and he recognized this. He says that his senses are active all the time; he sees and hears everything. What he did not realize was that this activity prevents his body from relaxing. He could understand that for his health it would be better if he could learn to put his senses to rest and to turn his attention inward. Through biofeedback training he learned which techniques were effective for him to lower his skin conductance. He combined biofeedback with mindfulness exercises at home, such as the body scan. After a few weeks of training, Mr W. reported that his head felt quieter and his headache had decreased. After 5 sessions, no further treatment was necessary because the headache was gone.

Case study: Fatigue

Mrs. B., 46 years old, visits my practice because she has felt fatigued, agitated and emotionally unstable for about 3 years now. These feelings get worse in situations when she does not feel welcome or accepted as the person that she is, for instance at work and at family meetings where she does not feel at ease. Her stress profile (see Figure 2) shows two things: fast and shallow breathing, and cold hands with the hand temperature decreasing further during the test. Also, unconsciously she tenses her shoulders. Hand temperature is determined by the amount of blood in the fingertips. When the body is in a state of alertness, the nervous system constricts the small blood vessels in the fingertips, to make extra blood available for the brain and large muscles that are needed to act quickly when there is danger or threat. Normally hand temperature decreases during mental effort and increases during relaxation and during recovery from a mental task. Cold hands may indicate that Mrs. B. approaches the world with suspicion and when I told her that, she admitted this immediately. She feels that people around her do not accept her, she feels alert, insecure and anxious. Her rapid shallow breathing can be explained by this as well, as it is a pattern associated with anxiety.

Although she previously was not aware of her breathing pattern, the stress profile made this visible for her and she wondered what would happen if she could learn to breathe deeper and slower. The therapy focused on the themes of safety and daring to be yourself. The breathing exercises gave her extra relaxation and she used the deep breathing in situations where she felt uncomfortable. She discovered that others

accepted her, even if she dared to be herself, and felt increasingly comfortable in groups. She found another job, which suited better to her. After a while also her fatigue diminished. In the last therapy session we conducted the stress profile again, and then her hands were warm and she responded normally during the test.

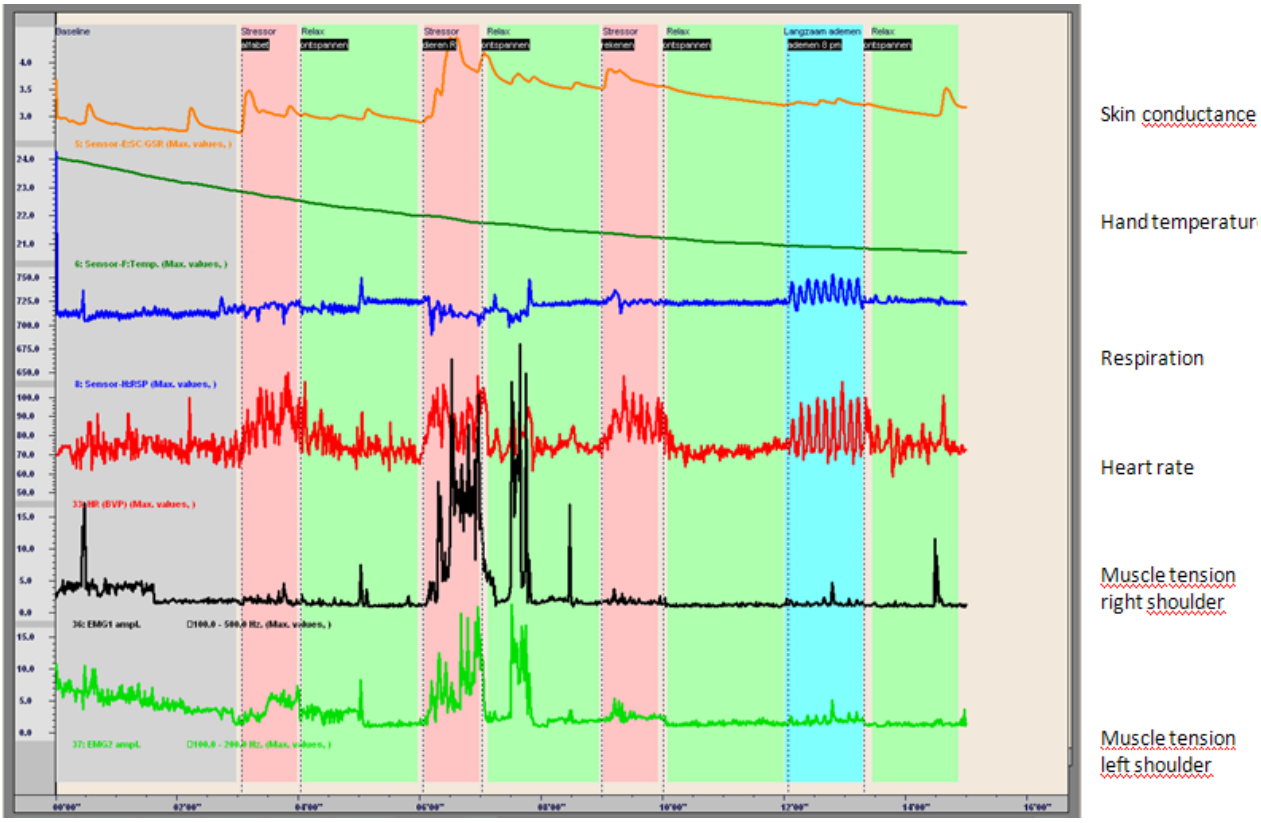


Figure 2: Stress profile of Mrs. B. Mention the continuous decrease in hand temperate and the rapid shallow breathing. Grey segment is baseline while reading, red segments are the stressors, green segments are the periods of relaxation and the blue segment is the breathing exercise

Conclusion

The psychophysiological stress profile shows what happens in the body in response to stress and provides insight into the ability to relax and to regenerate after stress. In case of stress related problems, the cause of the problems is made more clear and the treatment can be tailored better to the specific situation of the patient.

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We are not on average
Living in school and family when being different

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Do you remember the stories of your childhood? Max and Moritz, Struwwelpeter, Pippi Langstrumpf and – last but not least – Michel from Lönneberga… What do these characters have in common? They differed from the society's norms: they were unadapted, inventive, brave, funny, active and ready for action. Didn't we begrudge them their characteristics?

They weren't afraid of punishments and no one was able to bar them from living their lives as they see fit. Nowadays, one would call them "hyperactive children" or "children with ADHD". ADHD stands for attention-deficit-hyperactivity-disorder – a word that is as long as it is crazy. Probably, they would be given the amphetamine Ritalin®[1] and one would try to tranquilize them because the society is not able and/or does not want to handle children who behave more exertive and less adapted than the norm.

As you can see in the literature, they always existed – is it possible that today there are more than 20 or 30 years ago? Is it possible that we may have expectations that our children can't meet? Isn't it true that – in addition to an increasing individualization and changed parenting style – our environment is changing more rapidly than ever before and thus our life style is different compared to 30 years ago? And isn't it true that our surroundings have completely changed and consequently our behaviour and the functionality of our brain? Yes, that is true. And this is an indication of the organism's ability to adapt.

Not only our children, but also we ourselves mostly communicate via the internet instead of meet personally, we fall in love in the cyberspace (more than 10% of the relationships start here) and we are not afraid of the latest technology. This is the time we live in – the

[1] Designer drug **Ritalin®:** Medication like Ritalin®, Concerta® and others stimulate the release of dopamine. The demand for and the prescription of Ritalin® have increased fortyfold between 1995 and 2000. It is on the sixth place of the bestseller list of psychotropic drugs! **No other medication that comes under the narcotics act has a similar rate of increase!!!!!** (cf. Hüther, 2004)**.** This mere fact shows that AD(H)D cannot be an inherited disease. Researchers warn against the possibility that the drug will be sold as a surrogate for cocaine on German school yards: the agent resembles many illegal amphetamines in its effect on the brain. According to an Europe-wide study (scientific study, which was run by the Dresdner psychologist Prof. Hans-Ulrich Wittchen and introduced on September 5, 2011, by the *European College of Neuropsychopharmacology* (ECNP) and the European Brain Council (EBC), TU Dresden) **5 % of all European children** have a „diagnosed", drug treated h**yperactivity disorder: 8,24 Mio. Children!!!** Another 5 % suffer from dyslexia or dyscalculia. Thus, 16 Mio European children have a learning disease or according to ICD 10 educationally impaired. Every tenth child in Europe suffers either from hyperactivity or a learning disease…. And no one asks how that comes. The agency as well as the long-term effect of Ritalin® is as yet unknown. Nevertheless, it is prescripted and used rather indiscriminate and broadly (sometimes even via the internet!).

media age that was created by adults. The consequences of this different environment can be seen in our children's brains (comp. Gerald Hüther). All processes of adaption are at the same time selection procedures and not all children are able to keep up with this racy development. Thus, they have problems coping with our old-fashioned school system and with their social environment.

There are many possible factors why our children have these big adaptive difficulties nowadays. But what if you have such a little Michel or a Pippi at home? How did it happen, and when and where did the story start?

Our children are different … individuals from the very first

Let's have a look at the history of the development of children. Considering the results of the study from Largo (2010), one becomes aware of the fact that children are very, very different from birth on (actually even from conception). Some babies sleep eight hours a day or less, some up to thirteen hours a day. These differences are biologically determined and it does not make sense to impose a twelve-hour-sleep-rhythm upon an eight-hour-baby. Trying this, all you could end up with are problems. Loving parents will respect that and know that the only things they can determine about their child's sleep are when and where – but not how long. The same applies to ingestion. Some infants drink only about 600 ml milk, others up to 1200 ml. Trying to alter this instinctively predisposed amount would not make any sense as long as the infant thrives and prospers. But you, the parents, may decide what kind of nutrition your child gets.

Boys move more

The same applies to the need for exercise. There are studies measuring the number of a child's movement with a watch that is recording every single physical movement. Here it can be seen that the peak of movement lies between seven and nine years – an age when children suddenly have to sit still for lots of hours a day. The reason why boys have by trend more difficulties with sitting still is that their need for exercise is higher than the girls' need, especially in this phase of development. Whereas girls move between 1000 and 2000 times an hour, boys move about 3000 times on average. Obviously these children have more difficulties with sitting for hours. Because of their ignorance and the mistaken assumption that the child's physical activity is protest and opposition, some teachers try to discipline the child by making it stay on its seat during the break.

Unfortunately, there are few teachers who understand the children's need for movement and admit it. Normally, a few minutes is enough, and afterwards the children are attentive and concentrated. This need for movement is biologically determined, and looking back at the history of development one becomes aware that we are spending more time in enclosed rooms over the last 200 years. Prior to this – and sometimes even nowadays in the country – children grew up mainly outdoors. They were free to go out and find inspiring environments. In the civic area this has extremely changed and there is less space for exploring a natural environment and learning in life.

All children want to learn, some of them move whilst learning

All children are learning effortlessly and of their own accord from birth. Besides their natural motivating curiosity, their need for movement helps them to enlarge their learning environment and to move unrestrictedly. The need for movement is biologically determined and aims on the one hand at the development and improvement of the motor

function (in girls: fine motor skills first, in boys: gross motor skills first) and on the other hand at the development of the brain which is related to the motor function. Thus, a constraint does not only lead to the children's displeasure, but also to a constricted mental development which is by far more dramatic.

Regular and short but intense motion units embedded in the school day would be enough to meet the children's need for activity. Unfortunately, many educators do not consider the need for movement as a biological must. It rather seems to annoy and to overburden them. Inevitably, the children's school problems start here and sooner or later the parents are also involved. At home, the PC more and more becomes the surrogate for movement – but, at least we move virtually then and our brain is tricked. To the question why they are addicted to the PC, some youngsters reply: "At least in the virtual world real adventures still exist."

Even in animal studies it can be shown that animals become more intelligent when growing up in an enriched environment with inspiring stimuli, compared to those animals that grow up in a sparse environment[2]. Similar individual differences can be seen in language development: girls are by trend better than boys concerning linguistic skills. The vocabulary of first-graders amounts to 4000 - 7000 sometimes even up to 12000 words on average. All in all, the variability reaches from 1000 to 12000 words. The development continues linear and stays proportionally like this until senior age.

The same applies to reading skills. The reading skills diverge widely between the more talented and the less talented pupils. Thus, it is neither possible to create homogenous learning groups nor to coach the less talented individually. Following this line of thought, a comprehensive school that tries to apply one standard to all does not make sense: those who are further developed are bored and annoy the teacher, those who are below the average are not able to follow the lessons and also annoy the teacher. Imagine you are listening to a lecture and the lecturer is using a foreign word in every sentence. Possibly, you would become very agitated after a short while and thus either break or feel uncomfortable. That is how a child who is below the class' average could feel during lessons. Then, boys tend to calm down by physical activity. They become agitated and they interrupt, run around or annoy their classmates. This shows that they do not feel comfortable during lessons and the last thing you should do is to force them to sit still and to discipline them. Unfortunately, this is exactly what most teachers do. The communication booklet for the parents is full of demands noting that their child (usually son!) does not "function". Often, the grades reflect the teachers' helplessness, which is unfortunately more common than one would think. That is how talented children become discouraged and won't show a good performance at school. Annoyed parents resort to medication like Ritalin or something near it. Individualization means to acknowledge development-specific and at parts biological differences and to try to meet the children at the very stage of their development. It also means to acknowledge the differences between girls and boys concerning their development, to agree to these differences and not to make them equal like the education policy tries to do because of its ignorance. The different development of girls and boys is not concerned with intelligence at all. Boys have indeed worse chances in our school system but they are not less intelligent – that has repeatedly been proven by research.

[2] Vgl. Rosenzweig, Breedlove, Watson, 2010

After all, it is necessary to create rooms that facilitate individual advancement. A classroom with 25 children and one teacher cannot meet these heterogeneous conditions. Teachers – especially female teachers – who unfortunately are not aware of these individual differences are not able to afford the development – even if they wanted to.

If you're lucky, you are one of the educated and involved parents and you can help your child to compensate for the deficits the school system presents in your spare time. Generally speaking, this is rather the task of a specially trained therapist or educator and an individual setting can be created in order to provide proper conditions for exuberant development. Unfortunately, this pathologization is not a natural progression. Often, the child loses important years for development while participating in dyslexia courses or the like, instead of making use of truly efficient methods. During this time, frustration and the fear of failure are usually even more likely and it becomes increasingly difficult to break through these barriers. This is not a very pleasant prospect, but unfortunately it is the status quo in our country.

One could cite many other examples and the message of all these examples is this: We should accept, from the very beginning, that we are individuals and if we do this, then we have a much more authentic and more joyful life ahead of us, because we have developed self-worth and we do not need to slave away as adults in order to try to develop this, because we discovered ourselves during our childhood and because we were allowed to develop our talents without being assimilated into a corner of illnesses or disabilities. Only then can people achieve their individual potential.

Self-esteem develops very early in our lives and can only be developed when the baby is nourished with the feeling that it is endearing, without needing to do anything to have this feeling. Parents convey this feeling by learning to adequately respond to the needs of the child.

If parents knowingly bring children into this world, they usually want this child to experience a better childhood than they have experienced themselves. They want their children to be happy and encourage their children to be happy. If parents have learned to pay attention to the needs of children, then this concern is usually achieved very well by the time the child finishes kindergarten. We love them, simply because they are there and a part of who we are. Then, the day comes where, interestingly enough, every child joyously and slightly unruly awaits, because, thus far, the child has experienced the learning process as a natural condition of life. It has learned to get up and go, with many failed attempts, but none of these failures has been asserted and labeled as a failure. Finally, the child is able to walk or talk and they are proud of themselves. The word mistake or wrong is relative, unknown, or neutral up until this point. Now, they await the first day of school. Finally, they no longer belong to the very young and ‘small’ children. People see enormous backpacks with thin legs running around. These backpacks often appear to symbolize what will dominate the children's lives for the next 9-12 years. Mothers have emotional tears running down their faces and often have stomachaches, wondering if everything is going to go well. Often, a few weeks after the big day, the phones in psychological practices are ringing off the hook. What has happened?

Some years ago in the beginning of November, an article of mine about my work with children was published in a daily newspaper. Those were the two hardest and longest days I have experienced for a long time. From 7 o’ clock on Saturday night until late Sunday evening, my two phones rang non-stop. On the phone, crying, desperate parents

seeking advice were calling for which I spent a little time in every case. What is happening in our schools with our children that forces both children and parents to be under so much straining pressure? There must be something wrong when parents travel nearly 1000 km every second weekend to not only help their child, but to also be able to relax and be able to deal with their children once more!

Primarily during the school months, countless parents and restless, unfocused and quarreling children ask themselves the same question. What happened to the children, who up until this point seemed to be completely ‘normal‘ or at most slightly more active, to all of a sudden create so many problems?

Is the lack of certain talents an illness?

From a teacher’s perspective, when a child stands out, it's not long until different diagnostic suspicions arise. Various technical terms and diagnoses increase the insecurity of children, parents and teachers. ADHD, dyslexia, dyscalculia, partial performance weakness, etc. are all many different concepts, but they all have something in common: they describe people whose behaviour, motor or mental skills develop differently than in a statistical average of their peer group. Apparently, that is already more than enough in our society to be diagnosed and to stigmatize children. (Meanwhile, some of deficits have already mutated into actual illnesses and disabilities. The only positive effect of this is that the parents then receive increased child support!)

You might as well make a disease out of a lack of musical talent or a lack of ability in sports. Why does no one talk about singing disabilities, sports deficit disorder, or a drawing handicap, but everyone seems to discuss learning disabilities, dyslexia (reading and spelling disability) and dyscalculia (arithmetic disability)? Any behavior that deviates from social norms makes people uncomfortable, and if not acceptable will quickly be declared a "disorder" and treated with targeted, specific measures. When the disruption is viewed as a biological incidence, as is the case with hyperactivity, then the case will be claimed to be a disease, despite the fact that these claims are often not provable by scientific measures.

Children with ADHD (Attention Deficit-Hyperactivity Disorder), generally disrupt the classroom through restlessness, fidgeting, interrupting others whilst speaking, clowning around, high susceptibility to frustration, and subsequent aggressive behavior. ADHD children appear to be so strenuous that hardly anyone has a desire to tamper or deal with them. They are taunted by their peers and they are often viewed from the pulpits of overworked teachers as hopelessly anti-social and above all lacking, untalented beings. Often they are in fact very talented, very sensitive, and have the courage to be who they are in spite of the problems they seem to create. Sometimes they really also have no control over their emotions and suffer because of this.

But not everything that looks like ADHD is ADHD. Since there is no detectable diagnosis to determine if there really is a neurological disorder and for the few percent of children that actually have ADHD, one can imagine how many children are misdiagnosed, pharmacologically adjusted, and treated. Apart from these instances, even physically impaired and very restless children can still develop their motor skills very well in a completely normal environment (See also article: Fluke Problem Child from Bild der Wissenschaft, Oct. 2011).

Mentally overloaded children or even children with partial performance deficits often show the same symptoms such as hyperactivity. The same goes for traumatized children and children who grow up without limitations or parental boundaries. Also, some studies show that dietary habits or simply a mix of factors seem to play a role in these instances of hyperactivity and the diagnosis becomes even more difficult.

The question, which many people ask themselves when they reflect on their own situation and possibly ascertain in light of the fact that they themselves had such problems with hyperactivity and still managed to make something of themselves, is that: Why can our school system not accept the fact that there are children who simply do not follow social norms and, despite this, can still be intelligent, and in some instances can even be rather brilliant? Why also can there not be children in such as diverse population with many different lifestyles and living environments who, for example, can only learn if they move somehow, who can perform when they feel as if they have been called upon to do so, as well as many other variations?

Girls are different than boys

Problems in school affect boys more than girls. They typically respond more outwardly when they have problems and are therefore more conspicuous. They become restless, more forward, and run around more often, while girls tend to sit back daydreaming, mentally absent, and at first glance seem to not impair the teaching process. Our school, when one considers so-called gender-specific differences, is considerably more catered to girls by women, than for boys by men. Boys and girls tend to develop their different skills at very different times.

For example, boys develop the majority of their motor skills at the very moment when they enter school and fine motor tasks, such as writing in the lower case, are primarily requested. Boys are more fixed upon motor and visual elements, while girls tend to like to sit and listen more. Thus, upfront teaching tends not to be such a big issue for them. They simply dive right into their own world and tend not to make noise or disturb other pupils. However, this fact makes it even harder to figure out whether a girl is missing something and weather or not their success matches their real level of talent.

In some few elite private schools, gender studies have been taken into account. In some instances boys and girls are separated depending upon subject. However, it is often not enough to simply place the separate genders in different rooms. One must also adapt to gender-specific learning styles. Unfortunately, schools administrations and officials tend to only discuss the form of teaching and not the content. All-day school neither solves the lack of teacher training, nor the individuality required in the classroom. Even the term comprehensive school does not alter the contents of the still rigid gender policy leveler between the sexes. Nobody is interested in how learning can be really useful and what contributions teachers must make, so that education makes sense again and is made possible for all.

What is personal development?

As previously described, the willingness for learning and development invested in each child does not need to be specially promoted. There is one right time for each stage of development, at which the child is ready to perform the given learning task. If parents want to teach a child about cleanliness too early, then nothing is achieved. If the child wants to feed himself at the age of two, then it will try to eat by itself with a spoon. If you

put the spoon into your child's hand too early and insist that it eats with that spoon, then this will overwhelm the child and will often trigger resentment and resignation. The same attitude will apply later when it learns to read and when it learns other cultural skills.
When a child is ready for the next development step, it always shows us with its behavior. In principle, this is how our life still functions today. Often times, this afflicts people in many different necessary developmental steps, such as ending a relationship or quitting a job, and it sometimes takes years before one is inwardly ready to put forward the necessary measures. Individual learning means that we, as educators, must be willing to watch our children so well that we get a real feeling for the proper time of furthering development and at the same time not overwhelm and discourage them. Furthermore, it also requires that we know something about the mental and physical development of a child's problems. Stress and anxiety, in whatever form, largely prevents learning.

Sick children and children who suffer from psychological distress show no willingness to learn easily. This is likewise the case in adulthood. If you have relationship problems then you will also have problems achieving the same level of performance as in situations where you are doing well and have a lot of energy to focus on outside things.
Our lifestyle has evolved from the extended family in which there were many caregivers and educators, to small or micro-families. A divorce or a conflict-ridden relationship with the parents, for example, can strain a child so that it looks as if it were suddenly hyperactive, because it instinctively tries to reduce the internal stress with exercise. This would physiologically also be the right way! When we consider how many children suffer in a society with a divorce rate of more than 50%, how many children live in so-called patchwork families, how many children are of immigrant families, how many children are simply not understood in their home, and how many parents are overwhelmed with their children and their careers, then it becomes clear that our children can not function as well as we would suspect.

Personalized learning means that the child will begin at the point in which it is in its developmental process. This therefore implies that the educator would have to take a holistic picture of a child in order to really assist it adequately. This requires the necessary know-how and a lot of time, which teachers today do not have. A very dedicated teacher, who cares for the integration of children, told me recently that she goes into the environment of every child of which she supervises (about two to five children per classroom) during her free time in order to better understand and empathize with their individual situations. Unfortunately, this is truly an exception.

In all reality it is the school that is sick, because it suffers from a distinct deficit-oriented thinking process and it continues to prevent a more natural learning process, and it calls for additional learning support from parents. The parents tend to pressure their children, generally out of fear and in order to reinforce the competitive thinking, which leads to a vicious circle of misunderstanding and, ultimately, it does none of the parties involved any good.

Teachers expect parents to take measures in order to treat the prescribed deficits, which simply will not work. Support measures should be used very cautiously, because over-treated children lose confidence very quickly. It is better to help a child cope with his deficits. For example, there is no problem to learn the equation one times one with movement. It is also important to learn what children can do when they are not allowed to work out their need for movement. For example, one of the techniques taught is progressive muscle relaxation, in which the child can perform without attracting attention,

such as breathing techniques that make the child a little quieter within a few breaths and therefore increase their productivity. This approach also follows the method of biofeedback, which is highly popular amongst children because there is no therapy in the medical sense which tells them that they are specifically sick or ill. This method allows the child to also learn a bit of self-efficacy (see biofeedback).

Children are naturally the champions of practicing. See for yourself how often they attempt to stand up until it works. They are able to absorb setbacks and step up their efforts until they master the task. It is biologically impossible to think that children are successful sooner if they are only encouraged enough.

When children cannot concentrate properly or are given tedious tasks, most of them will refuse. When children with learning problems, who are already at a disadvantage in school life, still have to learn for many additional hours, then that is not only unfair, but also frustrating. Therefore, it makes much more sense to change how they learn. Let your child allot their work time at home, and animate your child to move during this time if it feels the need to do so. Let your child jump as high as it possibly can for a minute, be clumsy, be noisy or quiet just long enough for them to feel inwardly calmed to concentrate on work for the next few minutes. Work with all of the learning tricks that you know and are new to (Vera Birkenbihl's Stroh im Kopf (literally: straw in the head, is a good source for this). Make the learning situation the most pleasant and fun possible for the child and do not forget your own performance expectations.

I remember a hyperactive boy who came to my office. I explained to him that I needed an exercise break every 5 minutes, because I did not want to sit quietly. I did this so that I would not give him the feeling that there was something wrong with him. So we went on and did the first few hours consistently kickboxing, balancing, jumping, and taking ball and drum breaks for the first 3 training sessions. On the fourth hour, I jumped up and announced the exercise break. The child was very focused on his biofeedback training and was successful in controlling his own physiology. He looked at me and said, "Would you mind if you move alone today? I would like to continue training". From then on, he could work a full hour by himself concentrated.

Education is a Relationship

Remember back to your time at school. In which subjects were you particularly good and what is the relationship you had with the respective teachers of your favorite subjects? In these subjects you probably had a teacher that you liked or somehow respected. Whether a child obeys a teacher and follows their instructions depends, as in the family, upon the relationship. If the relationship is bad, children react more negatively, are denying, or are unruly. It is therefore very important that the parents of children who are a little restless, motorized or otherwise active in any other way outside of the social norm, take a close look at the teachers, at least in the elementary school. Also observe your child, because what works or worked for you might not be suitable your child.

Joshua attended the first grade of elementary school. The teacher appeared to his mother to be more like a fashion model in her stilettos and mini skirts. She looked thin and fragile and had a squeaky voice. She appeared to be a little helpless. She doubted that this was the right choice for her son. But she said nothing and watched her son. After three weeks, when he still had not written any tasks, she had a few questions. Joshua stood in front of her and said, "Mom, I have something to tell you now. That's my teacher and that’s her job. All of this has only to do with me and her". The mother found

this responsibility rather astonishing and since Joshua refused to do his chores at home, she decided to pay a visit to the teacher and to explain the situation to her. She told her that she was actually pleased that Joshua himself wanted to take up his own responsibilities. The teacher agreed to inform the mother if there were any problems. Every four years, Joshua completed all of his responsibilities completely on his own. If he forgot something, then he woke up early on his own, too. One day he said that the mothers of his friends checked and corrected the homework of their children so that they could receive a better grade. His mother offered to do the same for him, but he said he would prefer the note that he deserved. The teacher had a good relationship with him, which stood above all. In high school, this situation changed abruptly and Joshua refused to do his tasks.

The success of any measures you use depends largely on the quality of the relationship. The best therapist is the one who manages to establish good relationship. Studies show that this is much more important than the method the therapist uses.

How can biofeedback help?

A treatment of the appearance of hyperactivity or AD(H)D is necessary if you feel that your child is suffering from over-empowerment, a lack of ability to control a situation, and therefore has many unnecessary difficulties. The same goes for a child that would like to do more, but cannot due to the over-empowerment and easy distractibility. Biofeedback is a scientifically well-recognized and proven non-drug form of treatment for ADHD and learning problems, as well as for many other symptoms and syndromes.

The most important thing is that this method is free of negative side effects.

Your child will learn, in every case, a few essential tricks to control its attention to focus, to keep its activation at a normal level, and to better concentrate on one thing. This is not only an important prerequisite in order to survive in everyday school life, it is also a method that helps to conserve the body's own energies and a way to improve health.
Over-activity of the autonomic nervous system leads to a reduction of the defense mechanisms, both of the immune system as well as psychological defense mechanisms. This, in turn, leads to a massive loss of energy, and a lower energy level is harmful and affects both our psyche and our performance in a strongly negative manner.

Most children learn self-control and self-competence, empathy and resilience (stress resistance) in only a few sessions and want this type of training, since they will regain the feeling of self-competence. Their frustration tolerance is increased and it can additionally significantly reduce their nervousness.

The key physiological mechanisms, the central point of shortcuts through the brain stem to the hypothalamus and finally to the frontal lobe (the center of the free choices), seem to sound complicated, but are easy to acquire.

In regards to the intentional influence (as well as the control thereof on the screen) first and foremost of respiration, heart rate, blood circulation, the temperature of the hands, muscle tension, in addition to certain brain waves are positively affected.

Thus, children learn to produce a certain level of arousal in the brain and also remain aware of these conditions for a quiet and power-optimized state.

The activation levels in the brain are kept in check and they decrease the activity of desire-focused attention. This is a technique which star athletes and NASA astronauts also learn, to train both biofeedback and neurofeedback in order to attain optimal performance levels.

In general, the children learn in the first few hours of training and begin to test the effectiveness of what they have already learned in everyday life. In advanced training, children learn to focus their attention on certain distracting stimuli such as noise and so-called "attention thieves" and are no longer so strongly influenced, if not influenced by these at all.

How does a training secession appear in reality?

Imagine that you are sitting at a computer screen, where your favorite comic book, animation, music or video is playing. The only difference is that you control this video yourself using your body. When you are producing more pressure to succeed, inner tension and negative thoughts, the video stops. You learn in a short time to lower your activation to a specific level of operation and the video thus keeps you in focus. Every single thought, every inner impatience is thus confirmed and the children learn how the stimuli, whilst small, can tear them away from their desired alignment. When increasing difficulty levels are used and the internal images of their favorite videos or their favorite music on their mobile phones can also preform as a dry operation for an internal feedback, then the trained state of calmness becomes easier to recall.

Therefore even young children quickly learn to get out of learned helplessness and stress in problematic situations via the greatest possible self-efficacy by learning to perceive and consciously alter their physiological parameters (respiration, heartbeat, muscle tension, hand temperature) and stress in order to escape the trap. Usually they learn with the so-called ‘Mini-Max Intervention’, which was developed in the Holistic Learning Institute of Ms. Fuhs over years of dedicated research, never last longer than one to two minutes, and can be applied everywhere completely unnoticed, as long as it is trained well.

A research group led by Ingrid Phillipens at the Biomedical Primate Research Centre (http://www.newscientist.com/article/dn20989-monkeys-meditate-for-marshmallows.html) in Rijswijk, the Netherlands was able to show with monkeys, that even they were able to learn a state of focused attention via only one or two sessions, when marshmallows were used as a reward. The monkeys certainly did not do this in order to put themselves in a meditative state, but simply because of the marshmallows. However, it shows how important it is that research in this area for attention-disordered children and adults is conducted. In addition, there are also more productive methods than Ritalin ®, which also act sustainably and do not cause problems to reoccur after discontinuation of the medication. The side effects of marshmallows and other sweets are certainly not as bad as the drugs that fall under the narcotic substance acts or laws.

Children learn these soft skills (i.e. social skills) not for school, but for their future, because they can do this in almost all situations and it allows them a potential advantage over others who do not have these skills. Finally, stress resilience is not only a way to be successful, but also for the regulation of physiology and related biochemical reactions, which are a protective factor for our physical and mental health.

When does a child need help and what can you do?

A child needs help when it suffers under the current situation. Here are a few examples from direct experience.

Marian's mother told me that her son, after an emotional breakdown in which he is relatively uncontrolled and sometimes even aggressive, was crying. The mother was suffering from the outbreaks and Marian noticed this one day and said: "I wish I were dead, then you wouldn't be sad anymore". He makes similar statements until she realizes that he and they really need help.

Dominik's mother called because her son, after four weeks of school, just continued to cry even more. The teacher, despite a dyslexia report, cannot recognize that the boy cannot spell better. Dominik was in a dyslexia course for two years and the mother thought that this was all that can be done to help. Now, she is procured because her child is not doing well psychologically.

Kilian's mother told me that her son always had problems in school because he was restless and inattentive and the teacher saw him as a nuisance. Believe it or not, he has changed schools twenty times in nine years, and still has not graduated. Imagine the life in this family! Kilian must have needed help.

Max is exceptionally intelligent, handsome, aware and interested in everything. He reads newspapers every day, makes pottery, paints and plays in a tennis club in his age group very well. He is charming, clever and sometimes a bit of a know-it-all, but you can talk to him very reasonably. The teacher sees it differently. In being a child who constantly believes to know everything better than others, and often forgets something, his teachers do not want to recommend him to a higher school. All of this even despite his strong level of performance. When the mother speaks to her and tries to reach an understanding with her child, the teacher replied with tears in her eyes that she has, in 23 years of teaching, never had such a child. She feels as if her own personal pedagogical skills are under fire and cannot handle it. Max in turn draws upon her mother's self-esteem about the fact that she is a good mother and has a good child. Both are disappointed and who gets hurt from all of this? Max of course!

Lorenz is a jack of all trades and is particularly interested in everything, but he avoids anything strenuous and cannot concentrate well. He is coupled with a lot of learning deficits and a lack of talents is poorly forecasted despite the efforts of his parents. The school has its own plans. First, they suggest to his mother to give the child Ritalin ®, otherwise they would not allow him into the class. When she refuses, they push him off into a special school.

Felix is a failure-oriented, very intelligent child, but he believes to be stupid, because he is afflicted by dyslexia much more than his big brother. Already in primary school (a Montessori school) he refuses to pay attention and still does his homework. However, he does not turn it in, because he does not trust that his answers are correct. The school is a disaster and he completes the 9th form with a failing grade. He opts for a private school and wants to try again, despite his ability to concentrate, and also looks more depressed. The new school is a special school where he learns on the basis of life experiences. In his new school, travel, drama, art, culture, are all combined with great initiative. Actually, the magnitude of what he needs to learn now, incomparably higher than in high school, are for the tests of more than two years of teaching material. Even

still Felix is a very good student and challenges himself quite a lot. He is confident and relaxed in no time. His behavior is social, enjoyable, and he is thriving.

Doris has been suffering for some time under unexplained abdominal pain. She can concentrate poorly and does not know what's wrong with her. She alternates between weepy and defiant and her parents no longer know what is wrong with her. She is taken aback, dreams a lot, she forgets her school supplies and her performance continues to slip lower and lower in her school. In an interview with the psychologist, she says that her best friend's parents got divorced and that her own parents often have disputes. She is afraid that her parents will also divorce and cannot concentrate on class work. She is so stuck in a downward stress and fear spiral that she cannot learn.

Fred is 20 years old and met me in a psychosomatic clinic. He was there because of his ADHD and personality disorders. He has only a simple high school graduation and turns out to be highly gifted. His parents did not know how to help him. Instead of trying to understand him, his father was always standing behind him while he was studying and struck him on the head when he was not concentrating.

All these children have had or have needed help. Help can never mean that someone is constantly pointing out shortcomings, but help shows where strengths are and how you can live with weaknesses. Biofeedback and neurofeedback currently display, though results are unfortunately rather unknown at the moment, probably the most direct and helpful way to optimize attitudes and performance levels in order to also optimize the mental health of a child. This does not only pertain to school, but also for a lifetime. This is due to the fact that we all have these weaknesses. However, this is also what make us human and lovable. In addition, we all want to be loved and respected. Let's all start together to love and respect others! Let’s accept our children as they are by supporting them and providing them the help which they require and also trust them so that they can find their own way.

EEG Bands During Wakefulness, Slow-Wave and Paradoxical Sleep as a Result Of Principal Component Analysis in Man

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Abstract: Human electroencephalogram (EEG) has been divided in bands established by visual inspection that frequently do not correspond with EEG generators nor with functional meaning of EEG rhythms. Power spectra from wakefulness, stage 2, stage 4 and paradoxical sleep of 8 young adults were submitted to Principal Component Analyses to investigate which frequencies covaried together. Two identical eigenvectors were identified for stage 2 and stage 4: 1 to 8 Hz and 5 to 15 Hz (87.95 and 84.62 % of the total variance respectively). Two eigenvectors were extracted for PS: 1 to 9 Hz and 10 to 15 Hz (81.62% of the total variance). Three eigenvectors were obtained for W: with frequencies between 1 to 7 Hz, 7 to 11 Hz, and 12 to 15 Hz (78.32% of the total variance). Power for all frequencies showed significant differences among vigilance states. These results indicate that slow wave activity can oscillate at higher frequencies, up to 8 Hz, and that spindle oscillations have a wider range down to 5 Hz. No theta band was independently identified, suggesting either that delta and theta oscillations are two rhythms under the same global influence, or that the traditional division of theta band in the human cortical EEG is artificial. Alpha as a band was identified only during wakefulness. Principal component analysis upon spectral densities extracted broad bands different for each vigilance state and from traditional bands, consistent with functional significance of EEG and with frequencies of generators of rhythmic activity obtained in cellular studies in animals.

Key words: EEG; spectral analysis; NREM sleep; REM sleep; wakefulness; principal component analysis

INTRODUCTION HUMAN ELECTROENCEPHALOGRAPHIC ACTIVITY (EEG) HAS BEEN TRADITIONALLY DIVIDED INTO BROAD BANDS ESTABLISHED by visual inspection because they are readily apparent to eye inspection, show specific frequency, voltage, morphology and regional predominance, and have specific reactivity (i.e., they appear and disappear under specific physiological conditions). 1-3 During wakefulness (W), the cortical EEG of normal adults is characterized by either beta or alpha rhythms. The alpha rhythm is characterized by waxing and waning, sinusoidal oscillations resembling spindles with a frequency range between 7—8 Hz and 11—12 Hz with a limited duration between 0.5 and 2 sec. They can appear isolated or in trains and they predominate in posterior and occipital regions.4-7 The rest of the time, the EEG is dominated by low voltage higher frequencies from 12—13 Hz to approximately 30 Hz with irregular morphology that have been termed beta waves or low voltage fast activity

or desynchronized activity due to their irregular morphology. Both rhythms coexist or predominate according to psychophysiological circumstances. Alpha predominates with eye closure in most of the subjects and disappears or is attenuated with eye opening, or when paying attention to external or internal stimuli when it is replaced by beta, so alpha has become a sign of internal relaxation, whereas beta predominates in states of arousal and it is evoked by external or internal stimuli and by electrical stimulation of activating systems.1-8 In past decades, activity with higher frequencies up to 80 Hz, or gamma, has also been recorded in the human scalp during activated states and in response to several tasks9-13 as well as during sleep.14,15 Sleep is characterized by the vanishing of alpha activity and the appearance of slower rhythms comprised within delta (.5 to 3-4 Hz) and theta frequency ranges (3.5-4 to 7Hz),1-3 and by specific waxing and waning oscillations between 12 and 14 Hz known as sleep spindles.16 The classification of sleep stages is based on visual detection of the predominant EEG activity over a limited period of time or epoch usually of 20 or 30 seconds, together with electromyographic activity and eye movements. Stage 1 is defined by low voltage, mixed frequencies with predominance of activity from 2—7 Hz and alpha during less than 50% of the epoch; stage 2, by the presence of sleep spindles and of slow activity of 2 Hz or less during less than 20% of the epoch; stage 3, by slow activity between 20 and 50% and stage 4 by slow activity higher than 50% of the epoch and stage REM or PS by relatively low voltage mixed frequencies. 16 Quantitative EEG analysis yields far more information than visual inspection. The use of spectral analysis and period-amplitude analysis has allowed for the discovery of important features of sleep, such as EEG differences among sleep stages,17-20 among successive sleep cycles,21,22 between men and women,19,23 after sleep deprivation18,24 and after extended sleep.25 Most of these studies however, have focused on traditional EEG bands mostly delta, or arbitrarily defined bands.26 Cellular recordings in animals have elucidated the molecular and cellular mechanisms underlying oscillatory activity particularly for slow waves, spindles and theta rhythm in animals. These studies have shown oscillatory activity in thalamo-cortical neurons or spindle oscillations with a frequency range between 6 and 14—16 Hz and slow oscillations from 1—4 Hz depending on the behavioral state of the animal and on the level of membrane hyperpolarization of thalamo-cortical neurons.5,6,8,27 The frequency range of spindle activity does not correspond to human sleep spindles described by visual inspection. Oscillatory activity in hippocampal complex of rodents or theta rhythm, corresponding to oscillatory discharges of hippocampal theta cells, has also been described with a wider frequency range, from 3—4 to 10—12 Hz, than the traditional theta band described for the human EEG, therefore it has been termed slow rhythmic activity. This rhythmic slow activity in rodents is related to voluntary movement, to arousal and paradoxical sleep (PS).28,29 It does not correspond to the frequency of theta activity in humans and, more important, it does not appear under the same physiological conditions. In the case of the human EEG, theta is recorded during sleep or in the waking EEG after sleep deprivation simultaneous to performance deterioration,30-34 whereas in rodents it accompanies alertness and motor activity.28,29,35,36 One of the most used techniques for quantitative analysis of EEG is the Fourier Transform. This analysis gives, by decomposing a complex signal in series of sine and cosine waves, the energy or power (micv2) accumulated over a period of time for every frequency within a given (which depends on the sample length and the sampling rate), even if they are concealed from visual inspection. Principal component analysis (PCA) allows for grouping variables that covary together and separating them from others that are orthogonally independent; it is therefore a useful tool to reduce variables and to investigate relationships between the new variables.37 Those variables that get gathered together in the same eigenvector are responding to or reflecting some common influence, while they are independent from those gathered in a different eigenvector.

PCA, therefore, can be used to investigate how frequencies from a power spectrum are grouped in bands.38-40 The aim of the present investigation was to explore if, by means of PCA, broad bands could be obtained fitting better the knowledge on oscillatory activity obtained by cellular recordings and closer to the neurophysiological features of vigilance states. EEG activity of a particular frequency, may have different meanings depending on the physiological state (i.e., 12 Hz, which is considered as alpha during wakefulness and as sleep spindle activity during sleep). Therefore, in order to investigate which frequencies are gathered into broad bands depending on the vigilance state, power spectra obtained from EEG epochs of W, stage 2 (S2), stage 4 (S4), and PS were submitted to separate PCA, one for each vigilance state. In a first approach it is necessary to perform these analyses starting from well-defined states. Since slow waves and sleep spindles are the predominant EEG activity during SWS, frequencies from 1—15 Hz entered the analyses.

METHODS

Eight adult right-handed male volunteers between 23 and 30 years of age, with regular sleep habits, apparently in good health and free of drugs, medications or caffeine intake participated in the study. Subjects were recruited from the university community and were interviewed and asked to fill out a questionnaire on sleep habits and health. All participants gave their consent to participate in the experiment. They spent two nights at the laboratory, the first one for adaptation to recording procedures. Electrical activity during spontaneous sleep from the second night spent at the laboratory and from previous wakefulness with eyes closed, was monopolarly recorded from F3, F4, C3, C4, T3 and T4 referred to ipsilateral earlobes, from left and right eye referred to A1, and bipolarly from chin muscles on a Grass model 8-20E polygraph with filters set at 1 and 35 Hz. All night EEG activity was also captured and stored directly on a PC computer (Pentium 100MHz) through an Advantech model PCL812 analogue-to-digital converter of 12 bits resolution with a sampling rate of 128 Hz by means of CAPTUSEN, a data acquisition program. 41 Sleep stages were identified on paper and computer recordings according to the standardized manual for sleepscoring16 by two independent scorers. Two-second epochs, artifact-free, from Wand from S2, S4, and PS from the second cycle of the night were selected for further analysis. To assure that data entering PCA, and therefore the bands extracted, belonged to the corresponding sleep stage, sleep epochs were selected after six 30-minute sleep epochs fulfilling the criteria for scoring each sleep stage and followed by at least another 30-min epoch of the same stage. The first 10 two-second epochs from each vigilance state fulfilling these criteria were fast Fourier transformed. Power spectra with 1 Hz resolution for each subject, derivation and physiological state were obtained by averaging power derived from the ten-sec epochs. Evidence from statistical tests has revealed stationarity ranging from one to several seconds, usually one to four-second epochs.2 Ten epochs of two seconds of EEG have proven to satisfy both, stationarity and stability for power analysis. This time span is short enough to prevent the statistical parameters from changing during the epoch2,42,43 and similar spectra have been obtained when analyzing either 20 seconds continuosly or divided into 10 two-second epochs.44 To investigate which frequencies covaried together and which were independent, power spectra from 1 to 15 Hz from all derivations were submitted to PCA, one for each vigilance state (S2, S4, PS and W), with EEG frequencies as variables. The following criteria were used: eigenvalues higher than 1.00 for eigenvectors, and factor loading higher than 0.60 to include or exclude a frequency in a factor or eigenvector. Varimax rotation was used. In order to validate the selection of EEG epochs as representative of each vigilance state, absolute power (AP) of each frequency and derivation was log transformed, and compared among states by means of ANOVAs for repeated measures with W, S4, S2, and PS as the within-subjects variable.

For post-hoc pair wise comparisons, Tukey´s Studentized t-tests were used.

RESULTS

PCA yield two independent factors or eigenvectors with the same boundaries for S4 and S2 explaining 87.95 % and 84.62% of the total variance respectively, two eigenvectors for PS which accounted for 81.62 % of the total variance and three eigenvectors for W explaining 78.32 % of the total variance (Table 1). The bands identified by PCA were similar for the two stages of SWS, different for PS and W and from those appreciated by visual inspection. Figure 1 shows power spectra for SWS, PS, and Wwith the boundaries separating the frequencies that were grouped in each eigenvector. The two independent broad bands that were identified by PCA for S4 and S2 of SWS (Fig. 1 A) were: a band from 5—15 Hz (explaining 7.14% and 77.75% of the variance respectively) and a slow-wave band from 1—8 Hz (explaining 80.81% and 6.87% of the variance respectively) with an overlapping region between 4—8 Hz sharing the variance. The two bands grouped in two eigenvectors identified for PS (Fig. 1 B) were: a slow-wave band from 1—9 Hz (explaining 69.63% of the variance) with an upper limit higher than the one identified for SWS and a band from 10—15 Hz (explaining 11.99% of the variance).
The three bands identified for W (Fig. 1 C) were: a slow band from 1—6 Hz (explaining 52.35% of the variance), an intermediate band from 7—11 Hz (explaining 7.91% of the variance) and a higher band from 12—15 Hz (18.05% of the variance).

TABLE 1—Results from principal component analysis of EEG absolute power from 1 to 15 Hz. Eigenvalues (eigvalue), factor loadings, % of variance and total variance explained for eigenvectors higher than 1.00. Varimax rotated values

	STAGE 2		**STAGE 4**		**PARADOXICAL SLEEP**		**WAKEFULNESS**		
	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue
Hz	11.66	1.03	10.44	1.79	8.77	2.51	7.85	2.70	1.18
1	0.170	-0.854	0.662	0.164	0.533	0.255	0.707	-0.224	0.039
2	0.407	-0.875	0.893	0.244	0.874	0.198	0.766	0.018	0.350
3	0.472	-0.826	0.890	0.297	0.898	0.138	0.882	0.117	0.280
4	0.548	-0.773	0.877	0.309	0.918	0.184	0.707	0.337	0.435
5	0.637	-0.703	0.872	0.637	0.905	0.206	0.653	0.461	0.418
6	0.677	-0.665	0.879	0.664	0.934	0.154	0.644	0.367	0.538
7	0.628	-0.689	0.833	0.608	0.913	0.157	0.454	0.217	0.652
8	0.667	-0.655	0.774	0.645	0.863	0.239	0.346	0.167	0.855
9	0.776	-0.442	0.403	0.616	0.795	0.275	0.161	-0.014	0.922
10	0.763	-0.522	0.468	0.715	0.556	0.600	0.283	-0.048	0.880
11	0.763	-0.506	0.433	0.782	0.366	0.621	0.604	0.144	0.665
12	0.817	-0.422	0.349	0.864	0.286	0.827	0.461	0.681	0.382
13	0.848	-0.290	0.333	0.878	0.268	0.828	0.223	0.873	0.195
14	0.842	-0.307	0.203	0.860	0.083	0.889	-0.016	0.930	-0.002
15	0.795	-0.286	0.237	0.871	0.057	0.889	-0.077	0.920	-0.061
% of variance	77.75	6.87	80.81	7.14	69.63	11.99	52.35	18.05	7.91
Total variance	84.62		87.95		81.62		78.32		

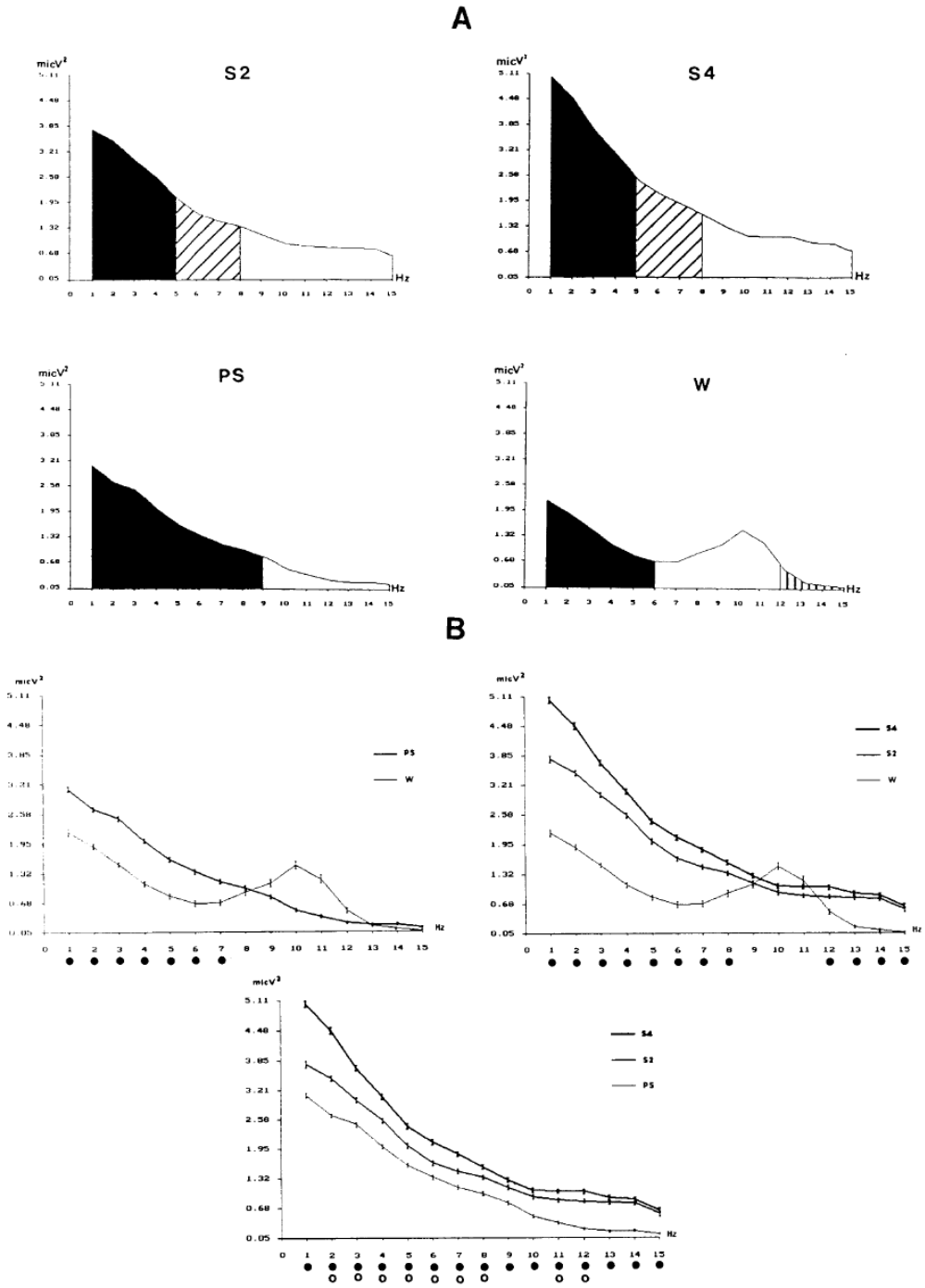

Figure 1 A—Absolute power spectra with one Hz resolution obtained from the mean absolute power of the whole group for stage 2 (S2), stage 4 (S4), paradoxical sleep (PS), and wakefulness (W). Horizontal divisions show the frequencies that were grouped by principal component analysis in independent eigenvectors; Hatched areas in the case of S2 and S4 indicate overlapping areas sharing the variance.

Figure 1B—Mean and standard errors of absolute power spectra with one Hz resolution for PS and W (black circles below indicate significant differences between PS and W), for S4, S2, and W (black circles below indicate significant differences between W and the two stages of slow-wave sleep), and for S4, S2, and PS (black circles indicate significant differences between PS and both slow-wave sleep stages and open circles between S2 and S4).

Statistical results from one-way ANOVAs for repeated measures for each frequency showed significant differences among states for all frequencies ($p<0.0001$ for all cases). Post-hoc pair wise comparisons showed the following significant differences between vigilance states: a) PS showed higher AP than for 1—7 Hz (Fig 1B); S2 and S4 of SWS showed higher AP than W for frequencies from 1—8 Hz and from 12—15 Hz (Fig 1B); b)

Stage 4 showed higher AP than S2 for frequencies from 2—8 Hz and from 11—12 Hz; and c) both stages of SWS showed higher AP than PS for all of the frequencies (Fig 1B).

DISCUSSION

As hypothesized, principal component analysis of power spectra of highly representative EEG activity of W, S2, S4, and PS, identified frequencies that covaried together and that were orthogonally independent from other frequencies for each physiological state. The bands identified by PCA were similar for S2 and S4, and different for PS and for W. These new bands were different form the traditional bands and from prominent activity appreciated by visual inspection, and perhaps the most important, these new bands are consistent with the frequencies of different oscillatory systems observed at cellular level and with the behavioral and functional significance of these rhythms. Power spectra of S2 and S4 were divided into only two identical bands, a slow band from 1—8 Hz and a band from 5—15 Hz with an overlapping region from 5—8 Hz sharing the variance. No theta band was independently identified and traditional theta frequencies from 3.5-4 to 7-7.5 Hz were included together either with slow activity or with spindle activity. These results indicate that frequencies from 1—8 Hz are under a common global influence and the same can be said for activity within 5—15 Hz but independent of each other. These results indicate that slow-wave activity can oscillate at higher frequencies, up to 8 Hz, and that spindle oscillations have a wider range down to 5 Hz. The frequency range identified by PCA from 5—15 Hz agrees with results obtained by cellular recordings of thalamo-cortical neurons, which show oscillations from 6 to 16 Hz with frequency depending on the level of membrane hyperpolarization.5,6,8,27,45, The separation of slow activity and spindle activity into two eigenvectors suggest that that there is a range of slow oscillations and a range of spindle oscillations as a consequence of two different incoming global influences and is consistent with the mutual exclusivity between spindles and delta oscillations observed in intracellular recordings of thalamo-cortical neurons8,46 and with results of time course analysis of power spectra over successive SWS episodes of one night which show reciprocal predominance either of delta or of sleep spindles in man 47,48 in cats,49 and rats.50 The existence of an overlapping region between 5—8 Hz suggest that both oscillatory activities have lower amplitude and/or energy in this intermediate region and therefore it is not appreciated by visual inspection; or that there is a frequency region where both influences are competing.

The fact that the new bands are similar for S2 and S4 despite the different amplitude observed by visual inspection and the different energies obtained with spectral analysis between the two sleep stages, suggests that both sleep stages share common mechanisms and probably are part of the same global state. Regarding theta rhythm, there are also two possibilities: one is that delta and theta oscillations are two rhythms but they are under the same global influence and therefore they behave in a similar way; the second one is that the traditional division of theta band in the human cortical EEG is artificial and theta frequencies do not correspond to an independent oscillator as in rodents28,29 but are the consequence of the same slow oscillations of thalamo-cortical neurons. The latter agrees with the reported increase in AP of frequencies between 1 to 6-7 Hz in the sleep EEG,18,24 and in AP of theta in the waking EEG after sleep deprivation32-34 and during drowsiness.31,32 These conditions are opposed to physiological states in which theta appears in rodents.28,29,35,36 Power spectrum from PS was grouped in two bands only; however, the physiological meaning is less clear.

During W, three bands were identified resembling the traditional bands, a slow band from 1—6 Hz with significantly lower power than during sleep, an alpha band from 7—11 Hz which showed a peak of power absent during sleep, and a third band from 12—15 Hz, that under this physiological state probably corresponds to beta rather than to sleep

spindles. Alpha frequency, as an independent band, was identified during W only, which is in agreement with physiological conditions where alpha band is apparent. Alpha and sleep spindles are characteristic of different conscious states, wakefulness and sleep respectively. Spindle oscillations, in animals, impair information flow through thalamic relays,51 whereas during wakefulness despite alpha activity, information flow is not impaired. Although the neurophysiological generators of this band are not yet clear,4,5,6,52 it is interesting that these frequencies appeared as an independent band only during wakefulness, suggesting that despite having similar frequencies as sleep spindles they are the result of two different mechanisms. A second possibility is that they share the same generator which changes its oscillatory frequency under different global influences. Although, the present results, obtained with the analysis of 20 seconds of EEG and from the second cycle of sleep only cannot be generalized, they are supported by the following facts: a) power spectra for each vigilance state are very similar to those obtained from all-night analysis18; b) statistical differences of absolute power among vigilance states agree with those reported in the literature with spectral power23 and period analysis;19 c) nearly identical eigenvectors have been recovered on different sleep cycles from the same subjects (unpublished results), and similar eigenvectors from another group of subjects with similar age, sex, handedness, social, and educational characteristics (results presented at the Third International Congress of the World Federation of Sleep Research Societies, 1999) and; d) the bands extracted by PCA included the most representative EEG activities characteristic of each vigilance state and in agreement with their physiological meaning. Present results are based on the analysis of EEG epochs with typical activity of each vigilance state and therefore it could be argued that it is not surprising that the bands extracted by PCA included the most representative EEG activities characteristic of them. Such epochs were selected on purpose. It is necessary to start with data coming from well-defined sleep stages. It remains to be investigated what happens in not so well-defined epochs or in those with atypical EEG activity. Although, definite conclusions can not be reached with the amount of data analyzed and further research is needed with longer periods of analysis, other sleep cycles, more derivations and different populations of subjects, present results demonstrate, without invalidating results obtained with traditional bands, that the use of narrower bands and PCA can give information which could otherwise be occluded. The new bands extracted by PCA upon spectral densities are consistent with cellular mechanisms of rhythmic activity and therefore seem more adequate than traditional bands for understanding sleep neurophysiology.

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INTERESTING ABSTRACTS

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How Placebos Change the Patient's Brain

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Although placebos have long been considered a nuisance in clinical research, today they represent an active and productive field of research and, because of the involvement of many mechanisms, the study of the placebo effect can actually be viewed as a melting pot of concepts and ideas for neuroscience. Indeed, there exists not a single but many placebo effects, with different mechanisms and in different systems, medical conditions, and therapeutic interventions. For example, brain mechanisms of expectation, anxiety, and reward are all involved, as well as a variety of learning phenomena, such as Pavlovian conditioning, cognitive, and social learning. There is also some experimental evidence of different genetic variants in placebo responsiveness. The most productive models to better understand the neurobiology of the placebo effect are pain and Parkinson's disease. In these medical conditions, the neural networks that are involved have been identified: that is, the opioidergic–cholecystokinergic–dopaminergic modulatory network in pain and part of the basal ganglia circuitry in Parkinson's disease. Important clinical implications emerge from these recent advances in placebo research. First, as the placebo effect is basically a psychosocial context effect, these data indicate that different social stimuli, such as words and rituals of the therapeutic act, may change the chemistry and circuitry of the patient's brain. Second, the mechanisms that are activated by placebos are the same as those activated by drugs, which suggests a cognitive/affective interference with drug action. Third, if prefrontal functioning is impaired, placebo responses are reduced or totally lacking, as occurs in dementia of the Alzheimer's type.

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Neurofeedback in ADHD: a Single-blind Randomized Controlled Trial

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21842168

Neurofeedback treatment has been demonstrated to reduce inattention, impulsivity and hyperactivity in children with attention deficit/hyperactivity disorder (ADHD). However, previous studies did not adequately control confounding variables or did not employ a randomized reinforcer-controlled design. This study addresses those methodological shortcomings by comparing the effects of the following two matched biofeedback training variants on the primary symptoms of ADHD: EEG neurofeedback (NF) aiming at theta/beta ratio reduction and EMG biofeedback (BF) aiming at forehead muscle relaxation. Thirty-five children with ADHD (26 boys, 9 girls; 6-14 years old) were randomly assigned to either the therapy group (NF; n = 18) or the control group (BF; n = 17). Treatment for both groups consisted of 30 sessions. Pre- and post-treatment assessment consisted of psychophysiological measures, behavioural rating scales completed by parents and teachers, as well as psychometric measures. Training effectively reduced theta/beta ratios and EMG levels in the NF and BF groups, respectively. Parents reported significant reductions in primary ADHD symptoms, and inattention improvements in the NF group were higher compared to the control intervention (BF, d (corr) = -.94). NF training also improved attention and reaction times on the psychometric measures. The results indicate that NF effectively reduced inattention symptoms on parent rating scales and reaction time in neuropsychological tests. However, regarding hyperactivity and impulsivity symptoms, the results imply that non-specific factors, such as behavioural contingencies, self-efficacy, structured learning environment and feed-forward processes, may also contribute to the positive behavioural effects induced by neurofeedback training.

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Chronic Constipation: an Evidence-based Review

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Chronic constipation is a common condition seen in family practice among the elderly and women. There is no consensus regarding its exact definition, and it may be interpreted differently by physicians and patients. Physicians prescribe various treatments, and patients often adopt different over-the-counter remedies. Chronic constipation is either caused by slow colonic transit or pelvic floor dysfunction, and treatment differs accordingly. To update our knowledge of chronic constipation and

its etiology and best-evidence treatment, information was synthesized from articles published in PubMed, EMBASE, and Cochrane Database of Systematic Reviews. Levels of evidence and recommendations were made according to the Strength of Recommendation taxonomy. The standard advice of increasing dietary fibers, fluids, and exercise for relieving chronic constipation will only benefit patients with true deficiency. Biofeedback works best for constipation caused by pelvic floor dysfunction. Pharmacological agents increase bulk or water content in the bowel lumen or aim to stimulate bowel movements. Novel classes of compounds have emerged for treating chronic constipation, with promising clinical trial data. Finally, the link between senna abuse and colon cancer remains unsupported. Chronic constipation should be managed according to its etiology and guided by the best evidence-based treatment.

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Determining the Optimal Pelvic Floor Muscle Training Regimen for Women with Stress Urinary Incontinence

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Pelvic floor muscle (PFM) training has received Level-A evidence rating in the treatment of stress urinary incontinence (SUI) in women, based on meta-analysis of numerous randomized control trials (RCTs) and is recommended in many published guidelines. However, the actual regimen of PFM training used varies widely in these RCTs. Hence, to date, the optimal PFM training regimen for achieving continence remains unknown and the following questions persist: how often should women attend PFM training sessions and how many contractions should they perform for maximal effect? Is a regimen of strengthening exercises better than a motor control strategy or functional retraining? Is it better to administer a PFM training regimen to an individual or are group sessions equally effective, or better? Which is better, PFM training by itself or in combination with biofeedback, neuromuscular electrical stimulation, and/or vaginal cones? Should we use improvement or cure as the ultimate outcome to determine which regimen is the best? The questions are endless. As a starting point in our endeavour to identify optimal PFM training regimens, the aim of this study is (a) to review the present evidence in terms of the effectiveness of different PFM training regimens in women with SUI and (b) to discuss the current literature on PFM dysfunction in SUI women, including the up-to-

date evidence on skeletal muscle training theory and other factors known to impact on women's participation in and adherence to PFM training.

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Comparing Biofeedback with Active Exercise and Passive Treatment for the Management of Work-related Neck and Shoulder Pain: a Randomized Controlled Trial

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21621660

To compare the effects of biofeedback with those of active exercise and passive treatment in treating work-related neck and shoulder pain. A randomized controlled trial with 3 intervention groups and a control group. Participants were recruited from outpatient physiotherapy clinics and a local hospital. All participants reported consistent neck and shoulder pain related to computer use for more than 3 months in the past year and no severe trauma or serious pathology. A total of 72 potential participants were recruited initially, of whom a smaller group of individuals (n=60) completed the randomized controlled trial. The 3 interventions were applied for 6 weeks. In the biofeedback group, participants were instructed to use a biofeedback machine on the bilateral upper trapezius (UT) muscles daily while performing computer work. Participants in the exercise group performed a standardized exercise program daily on their own. In the passive treatment group, interferential therapy and hot packs were applied to the participants' necks and shoulders. The control group was given an education booklet on office ergonomics. Pain (visual analog scale), neck disability index (NDI), and surface electromyography were assessed preintervention and postintervention. Pain and NDI were reassessed after 6 months. Postintervention, average pain and NDI scores were reduced significantly more in the biofeedback group than in the other 3 groups, and this was maintained at 6 months. Cervical erector spinae muscle activity showed significant reductions postintervention in the biofeedback group, and there were consistent trends of reductions in the UT muscle activity. Six weeks of biofeedback training produced more favorable outcomes in reducing pain and improving muscle activation of neck muscles in patients with work-related neck and shoulder pain.

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A New Neurofeedback Protocol for Depression

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21568194
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Neurofeedback represents an exciting complementary option in the treatment of depression that builds upon a huge body of research on electroencephalographic correlates of depression. The objectives of this article are threefold: review the literature on neurofeedback protocols for depression; introduce a new protocol, which aims to synthesize the best qualities of the currently available protocols; and present the results of a small clinical experiment with the new protocol. Structured survey of the literature; software development; clinical trial with one subject, submitted to ten sessions of neurofeedback (one hour each). Currently there are twenty-one articles in neurofeedback for depression, among which only six present original experimental results. All of them report positive results with the technique. The most used protocols focus on Alpha inter-hemispheric asymmetry, and Theta/Beta ratio within the left prefrontal cortex. Our new protocol integrates both dimensions in a single circuit, adding to it a third programming line, which divides Beta frequencies and reinforces the decrease of Beta-3, in order to reduce anxiety. The favorable outcome of our clinical experiment suggests that new research with this protocol is worthwhile.

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Psychophysiologic Treatment for Patients with Medically Unexplained Symptoms: a Randomized Controlled Trial

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Patients presenting with medically unexplained physical symptoms (MUPS) typically present with significant distress and marked impairment in functioning, and pose a unique challenge to health care providers. The purpose of this study was to examine

the efficacy of a psychophysiological treatment (PT) for MUPS. Thirty-eight participants meeting criteria for subthreshold somatization disorder (abridged somatization) were randomly assigned to one of two conditions: (1) standard medical care augmented by a psychiatric consultation intervention (wait-list) or (2) a 10-session, manualized, individually-administered PT added to the psychiatric consultation intervention. Assessments were conducted at baseline, at midpoint (after four sessions), and after completing the last session. The primary outcome measure was the severity scale of the Clinical Global Impression Scale anchored for Somatic Symptoms (CGI-SD). Secondary outcome measures were responder status as determined by clinical ratings, self-report measures of mental and physical functioning. At the end of the trial, the severity (and frequency) of physical symptoms improved significantly more ($p<0.05$) in the intervention group. The average improvement in the CGI-SD was 0.80 points greater in the intervention group than in the wait-list group. PT was also associated with greater improvements in self-reported functioning and depressive symptomatology. The effect sizes at the final assessment point indicate that this intervention had a robust effect on complex somatic symptom presentations. For patients with high levels of MUPS (abridged somatization), PT produces significant improvements in symptoms and functional status.

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A Wearable Respiratory Biofeedback System Based on Generalized Body Sensor Network

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21545293

Wearable medical devices have enabled unobtrusive monitoring of vital signs and emerging biofeedback services in a pervasive manner. This article describes a wearable respiratory biofeedback system based on a generalized body sensor network (BSN) platform. The compact BSN platform was tailored for the strong requirements of overall system optimizations. A waist-worn biofeedback device was designed using the BSN. Extensive bench tests have shown that the generalized BSN worked as intended. In-situ experiments with 22 subjects indicated that the biofeedback device was discreet, easy to wear, and capable of offering wearable respiratory trainings. Pilot studies on wearable training patterns and resultant heart rate variability suggested that paced respirations at abdominal level and with identical

inhaling/exhaling ratio were more appropriate for decreasing sympathetic arousal and increasing parasympathetic activities.

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Treatment of Migraine: Update on New Therapies

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21464715

This review provides a comprehensive selection of the latest clinical trial results in antimigraine treatment. The oral calcitonine gene-related peptide antagonist telcagepant is efficacious in acute treatment. Compared to triptans, its efficacy is almost comparable, but its tolerance is superior. The same is true for the 5HT-1F agonist lasmiditan, another agent devoid of vascular effects. Triptans, as other drugs, are more efficient if taken early but nonsteroidal anti-inflammatory drugs and analgesics remain useful for acute treatment, according to several meta-analyses. Single-pulse transcranial magnetic stimulation during the aura rendered more patients pain-free (39%) than sham stimulation (22%) in one study. Topiramate could be effective for migrainous vertigo, but it did not prevent transformation to chronic migraine in patients with high attack frequency. Onabotulinumtoxin A was effective for chronic migraine and well tolerated, but the therapeutic gain over placebo was modest; the clinical profile of responders remains to be determined before widespread use. Occipital nerve stimulation was effective in intractable chronic migraine with 39% of responders compared to 6% after sham stimulation. This and other neuromodulation techniques, such as sphenopalatine ganglion stimulation, are promising treatments for medically refractory patients but large controlled trials are necessary. One study suggests that outcome of patent foramen ovale closure in migraine might depend on anatomic and functional characteristics. Drugs with a better efficacy or side-effect profile than triptans may soon become available for acute treatment. The future may also look brighter for some of the very disabled chronic migraineurs thanks to novel drug and neuromodulation therapies.


16th BFE
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Workshops start one day early, on the 10th of September
Monday 10th September
Michael Thompson, M.D. & Lynda Thompson, Ph.D.
"Introduction to the Practice of Neurofeedback: Assessment leads to Appropriate Intervention - Day 01"
Registration Code: THOMP04
Tuesday 11th September
Michael Thompson, M.D. & Lynda Thompson, Ph.D.
"Introduction to the Practice of Neurofeedback: Assessment leads to Appropriate Intervention - Day 02"
Registration Code: THOMP04
Erik Peper, Ph.D.
"Stress Management with Biofeedback - Day 01"
Registration Code: EPSMB01
Marek Jantos, Ph.D.
"New Perspectives on Female Sexual Pain - Day 01"
Registration Code: MJNPF01
Paul Swingle, Ph.D.
"Basics of the ClinicalQ Assessment and Braindriving - Day 01"
Registration Code: PSBCA01

UPCOMING MEETINGS

Wednesday 12th September	Michael Thompson, M.D. & Lynda Thompson, Ph.D. *"Heart - Brain Connections: Neuroanatomy Underlies the Effectiveness of Interventions that Combine Neurofeedback with Biofeedback - Day 03"* Registration Code: THOMP02 Erik Peper, Ph.D. *"Breathing, biofeedback and related mind-body interventions to reduce chronic pain and anxiety - Day 02"* Registration Code: EPBBR02 Marek Jantos, Ph.D. *"New Perspectives on Female Sexual Pain - Day 02"* Registration Code: MJNPF01 Paul Swingle, Ph.D. *"Basics of the ClinicalQ Assessment and Braindriving - Day 02"* Registration Code: PSBCA01
Friday 14th September	Michael Thompson, M.D. & Lynda Thompson, Ph.D. *"Neuroanatomical Underpinnings for Optimal Performance Interventions: Foundations for Designing a Clinical Practice that Combines Neurofeedback with Biofeedback to Optimize important aspects of mental and psycho-physiological functioning in order to Set-up-for-Success - Day 04"* Registration Code: THOMP03 Donald Moss, Ph.D. *"Heart Rate Variability Biofeedback: What is Heart Rate Variability? What is its Medical and Psychological Significance? How Can We Optimally Train Positive HRV Changes? - Day 01"* Registration Code: DMHRV01 Francois Dupont, Ph.D. *"After an EEG Assessment: Integrated Neurofeedback - Day 01"* Registration Code: FDEEG01
Saturday 15th September	Donald Moss, Ph.D. *"Heart Rate Variability Biofeedback: What is Heart Rate Variability? What is its Medical and Psychological Significance? How Can We Optimally Train Positive HRV Changes? - Day 02"* Registration Code: DMHRV01 Francois Dupont, Ph.D. *"After an EEG Assessment: Integrated Neurofeedback - Day 02"* Registration Code: FDEEG01

Contribute to the growth of Biofeedback/ Neurofeedback by submitting your proposal for oral presentation, presenting posters, and workshops.

For more information, as well as submissions for the scientific program (symposia, lectures, papers, posters, short courses) and questions about industrial exhibition please contact:

GUIDELINES FOR SUBMISSIONS

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