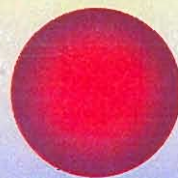
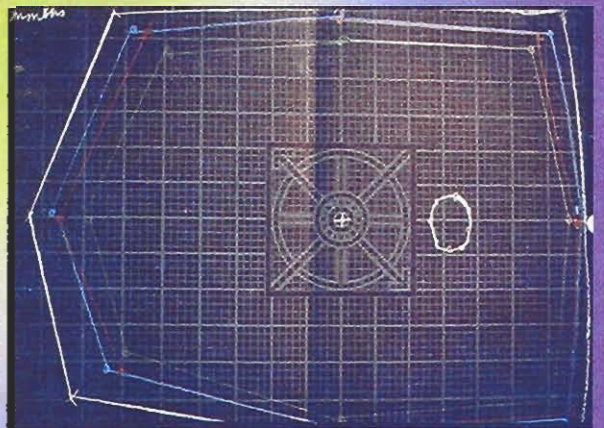
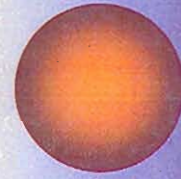
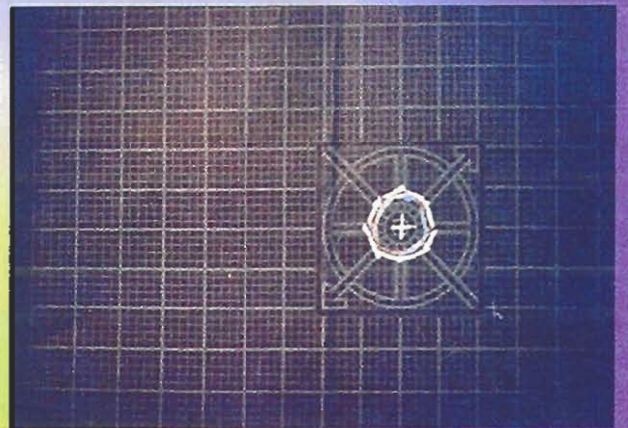


Journal of Optometric Phototherapy



Strabismus

Color Theory

Functional Visual Fields

Biotypes, Gender and Frequency

Subtle Energies

Biophotons – The Light in our Cells

MARCH 2005

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ABOUT THE COVER:

This is a case that was crossed with corrective Rx in place and bifocal for near.

This young female had been an Esotrope with or without her Rx. It is hard to tell the average Optometrist that this case straightened in only 8 V.T. sessions. I had this happen to me many times. Who would believe they would straighten this rapidly? First, run Optometric tests. The secret of this case is the functional field. I used Alpha Delta[10] and Mu Delta[10]. I went to 20 sessions even though she straightened after 8. The first field was 6 degrees in each eye, she was about that as an esotrope. Her reserve amplitude, positive and negative reserves went to normal.

With a functional field this small, these cases respond very fast. Go to your notes and see what Alpha Delta and Mu Delta does to the physiological system.

To those beginning, the college has a very good V.C.R. tape and a DVD on fields.

Syntonically Yours, Charlie Butts

SPECIAL THANKS:

Line editing by Anne Barber, O.D. of Puyallup, Washington.

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College of Syntonic Optometry



A NONPROFIT CORPORATION DEDICATED TO RESEARCH IN PHOTORETINOLOGY.
THE THERAPEUTIC APPLICATION OF LIGHT TO THE VISUAL SYSTEM

Dear Colleagues,

The key word I think that defines our organization is visionary. Not as the idealistic or impractical meaning, but as a futurist and creative force in medicine and healing of the next millennium. Optometry is experiencing unparalleled growth, driven in large part by technology that is more diagnostic than therapeutic. But it is the art and skill of the practitioner that it is most important in healing. What Syntonics brings to the therapist is a holistic approach that treats the patient beyond just biophysics utilizing what may be the most powerful modality of the future. It also requires looking at the person from multiple levels that continue to evolve the discernment of the practitioner in a lifelong study of this healing art. That is part of the excitement of doing the light work.

The field of color and light is exploding in science, medicine, and technology. Biophotonic applications can be seen in biological diagnosis, multiple therapies, and in computer communication. We now know our own bodies communicate by intercellular transfer of biophotons. Lasers, LED's and electromedicine are the emerging tools of this century's healers. Syntonics has been a leader in this field. Syntonics has kept the flame alive for 75 years and it is burning brighter than ever.

CSO continues to achieve increasing recognition both within optometry and world wide from other health practitioners who utilize color. Our organization is held up as a model of success for furthering this science and practice. Around the world other color healers look to Syntonics as a source of knowledge and inspiration. The CSO faculty continues to offer educational seminars in our work. Betsy Hancock and Mary Van Hoy have given basic courses this year in the USA while Ray Gottlieb and Sarah Cobb have taught on the West Coast and were invited to Portugal and Italy as well. Cathy Stern will be teaching a Basic Course in Spain very soon which will give CSO new members from that part of the world. I gave both a Basic and Advanced Course in Sydney Australia to our CSO colleagues this past September. This was my third trip there to teach. This journal will attest to the hard work of our editor Sarah and to our commitment to continue to advanced knowledge in this field.

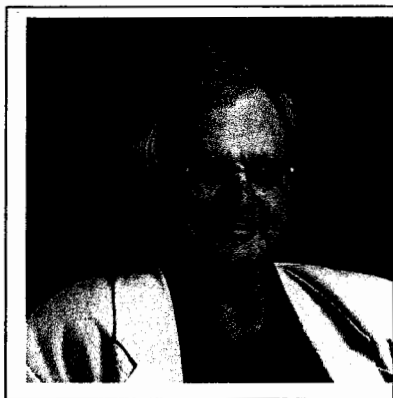
This year's conference will again offer some of the latest and most exciting information in Syntonics and color therapies with the continued goal of adding to our depth of knowledge. We will have keynote speakers on cranial-sacral therapy with Sam Berne, Colorscope Treatment from France with Pierre Van Obberghen, Color Homeopathy with Ed Kondrot and the latest in audio-visual entrainment by Dave Siever. The faculty will offer basic training for OD's and this year non-OD's, plus several advanced lectures including blue light research from Simon Grebevsky. The venue will be fantastic as will be the reunion of our family of light workers. See you in Santa Fe.

Yours truly,

A handwritten signature in cursive script that reads 'Larry Wallace'.

Larry Wallace, O.D., FCSO
President, CSO

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BIOPHOTONS – THE LIGHT IN OUR CELLS

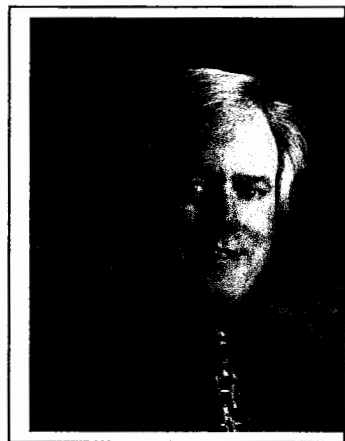
Marco Bischoff is an author and consultant in Berlin, Germany. He is on the board of directors of the International Institute of Biophysics. He has authored Biophotons – the Light in our Cells and Tachyons, Orgone Energy, Scalar Waves – Subtle Fields between Myth and Science.

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SYNTONIC CASE STUDY – STRABISMUS

Dr. Betsy J. Hancock is the Director for Vision Therapy for Albright Care Services. She practices in Pennsylvania, balancing primary care with syntonics and vision therapy. She would like to teach more basic courses in the future to encourage other optometrists to incorporate syntonics in their vision therapy practice.

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SUBTLE ENERGIES AND ENERGY MEDICINE

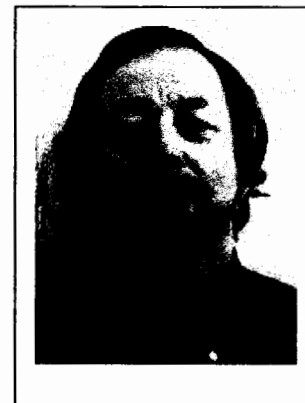
James L. Oschman, Ph.D. is the author of Energy Medicine: the Scientific Basis, and Energy Medicine in Therapeutics and Human Performance. He lectures on the science behind a variety of emerging medical techniques. He has worked in major research labs around the world. Jim has degrees in Biophysics and Biology.

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STRESS AND READING, A NEUROLOGICAL APPROACH

Optometrist Geoff Shayler was the first optometrist in England to include syntonics in his practice and obtained Fellowship in CSO in 2001. He lectures on behavioral optometry, functional fields, and syntonics, having published many articles on these topics in Europe as well as the U.S.

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BIOTYPES, GENDER AND FREQUENCY

Sarah Cobb is Editor of the *Journal of Optometric Phototherapy* and an Executive Administrator in the College of Syntonic Optometry. She has presented at several International Light Conferences. She also writes novels.

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THE NEW PROCESS COLOR THEORY

Steven Vazquez, holds a Ph.D. in counseling psychology and has developed natural, accelerated methods of psychotherapy, Emotional Transformation Therapy™. He has also developed a form of energy medicine used with psychotherapy called Confluent Somatic Therapy increasing treatment speed and power.

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AUTONOMIC NERVOUS SYSTEM AND LIGHT FREQUENCIES

Dr. Francis Mc Manemin is a licensed Psychologist with a background in behavioral medicine. Her clinical work and research have been focused on the use of photic stimulation and physiological monitoring. As a professor she has taught biofeedback and physiological monitoring. She is president of the International Light Association.

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FUNCTIONAL VISUAL FIELDS FOLLOWING BRAIN INJURY

Dr. Ray Gottlieb is the Dean of the College of Syntonic Optometry and recipient of the H. Riley Spitler Award. His presbyopia method is now available on video. He lectures internationally, writes, and practices in Rochester, New York.

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A CONVERSATION WITH CHARLIE

Dr. Charlie Butts, Dean Emeritus of the College of Syntonic Optometry, has applied phototherapy to over 3000 of his patients and has had an enormous influence in Optometry. He created the basic course in syntonics and has mentored many of the accomplished Syntonic Practitioners. He still enjoys enlightening new optometrists.

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LETTERS

The opinions expressed in this section are those of the writers, and do not necessarily reflect the view of the *Journal of Optometric Phototherapy*. We reserve the right to edit letters as needed. Address email to: Sarah Cobb, eyeamsarah@hotmail.com

Dear Editor,

We would like to announce the formation of the *International Light Association*.

Our aims are:

- To support and encourage those working with light and colour for the enhancement of human function
- To gather and disseminate information about the positive effects of light and colour on personal health
- To promote research and to apply its knowledge in the field of light and colour
- To maintain ethical standards in all areas of research and practice
- To recognize and accredit where applicable the excellence in training and education
- To develop new educational initiatives for light
- To promote friendship and cooperation across the disciplines

The ILA, a non-profit, European Union, accredited organization, was founded in Rorschach, Switzerland in September 2004 by, a group of about 70 health practitioners and professionals-interested in the therapeutic use of Light and Colour.

The ILA is committed to encouraging young scientists, clinicians, artists and especially, alternative and complementary health practitioners, to enter the field by archiving and making available research and educational materials regarding the use of Light and Colour, and by eventually providing a University where students will obtain degrees in Light and Colour Applications. Our 2005 International Conference will be held in Brussels, Belgium from October 14th -16th.

Applications for membership:

Vivi Andersson at vivi@amethyst.no

Website: www.international-light-association.com

Contact phone for USA:

Brian and Jennifer Breiling,
Light Years Ahead,
530-478-9592 or 800-814-3369.

Contact phone for the UK :

Primrose Cooper 01825762964

We invite you to join us in this organization. Several of the Syntonic's officers (Larry, Ray, Sarah and Don) have played a major role in helping at every step to put this new organization together and give it life and light.

Frances A. McManemin, PhD
President
International Light Association

* * *

Dear Editor,

The impact of the information provided at the meeting in Phoenix still has me reeling. Like the information provided by Hubel and Wiesel and by Howard Bartley et al., it has taken me a quantum leap ahead. It does appear that the effect of the TBI can be far more widespread than I had supposed and may not differ in some respects to the effects of colored lights. This mind expanding meeting is the most exciting that I have experienced in 35 years.

Because of Steve Cool's presentation, I now understand why the TBI was so helpful during the birth of a baby.
Sincerely yours,
Merrill J. Allen

* * *

Dear Editor,

I am the parent of a 3 ½ year old boy who just completed a 5 week session of syntonic phototherapy for strabismus. The results have been amazing! He is now progressing to vision therapy. Is there an advocacy group or someone I can write to tell about this wonderful, non-surgical procedure? I have read there is no scientific proof that syntonics works – one could never guess it by the improvement seen in my son.

Thank you!
Wendy Janerella

BIOPHOTONS – THE LIGHT IN OUR CELLS

By Marco Bischof

Light is not only what brightens up our world by day and makes us see the things around us, light is also produced by our own cells and forms a major component of man's inner environment and a non-material part of our bodies connecting us with the outer environment. The existence of this endogenous light has been discovered in the 1920's by the Russian embryologist Alexander Gurwitsch and has been conclusively demonstrated by modern biophysicists since the late 1960's with state-of-the-art technology and methods.

All living organisms, including humans, emit a low-intensity glow that cannot be seen by the naked eye, but can be measured by photomultipliers that amplify the weak signals several million times and enable the researchers to register it in the form of a diagram. As long as they live, cells and whole organisms give off a pulsating glow with a mean intensity of several up to a few ten thousand photons per second and square centimeter. This corresponds to a candle-light seen from 15 miles distance and is tens to hundreds of millions times weaker than daylight. This glow can also be made visible by means of a CCD camera whose input of differences in brightness is then transformed by a computer into colors displayed on a video screen. Because of its low intensity, this cellular glow, also known as biophoton emission, is often referred to as ultra-weak cell radiation, or ultra-weak bioluminescence. Its spectral range of frequencies (colors) extends from 200-800 nanometers, i.e., from UV-C and UV-A through the whole visible range into the infrared part of the spectrum. It should not be confounded with the „bioluminescence“ of fire-flies, glow-worms, deep sea fishes, and rotting wood which is much stronger, has different properties, and is clearly of chemical origin.

Historical development of biophoton research

Biophotons were discovered in 1922, when the Russian embryologist and histologist Alexander G.Gurwitsch (1874-1954) performed an experiment with onion roots. He found that some influence from the dividing cells at the tip of one root stimulated the division of cells in the other root. When he observed that this influence passed

through quartz glass, while it was blocked by ordinary glass, he concluded it must be a „mitogenetic radiation“ in the UV range. Gurwitsch was convinced that this radiation was an expression of „morphogenetic fields“ within the organism that structured and organized the life processes in the cell and the organism. However, with the technical means available from the 1920's to the 1940's, Gurwitsch and his collaborators at the Leningrad Research Institute for Experimental Medicine and at the Academy of Medical Sciences in Moscow were not able to reliably measure mitogenetic radiation. They mainly used „biological detectors“ such as the onion root just mentioned, or yeast cultures, to register the radiation. Only when after World War II photomultipliers became available to biomedical researchers, measurements proved the existence of cell radiation beyond doubt. They were able to detect a hundred times weaker photon streams and could even register single photons.

In the West, this happened first in 1954-55 when the Italian biophysicists L.Colli and U.Facchini and their collaborators at the University of Milan verified Gurwitsch's discoveries with the new technology and showed that sprouts of various plants emit visible light. However, after their two publications they did not continue the investigations. In the 1960's the first reports by Russian scientists about „ultraweak cell radiation“, as mitogenetic radiation was now called, were published in Western languages. While Russian scientists had done extensive investigations with photomultipliers since the late 1940's, systematic Western research in this field only started with the experiments of the Australian physical chemist Terence I.Quickenden in the late 1960 and early 1970's, and finally with the work of the German biophysicist Fritz Albert Popp from 1974 onwards. Popp and his collaborators at the University of Marburg, and later at the University of Kaiserslautern and the International Institute of Biophysics at Kaiserslautern and Neuss, were the first to carry out systematic experimental and theoretical investigations of all questions related to this new biological phenomenon.

In the 30 years since then, Popp and his colleagues – and many other researchers all over the world – have not only demonstrated the existence and ubiquity of biophoton emission beyond any reasonable doubt, but

also have established its properties, have developed and tested a number of hypotheses about its possible biological functions for which much evidence has been found, have done a lot of theoretical work towards a biophoton theory explaining all or some of the phenomena observed, and have started to develop a number of practical applications for the use of biophoton measurements of microorganisms, plants, animals, and humans. Today, the International Institute of Biophysics (IIB) founded by Popp and some of his colleagues in 1996 has become an international research network comprising 22 members of 14 research groups at universities in the USA, China, Russia, Poland, India, Japan, Korea, Israel, Italy, England, and Germany. Altogether, there are about 40 research groups worldwide working in biophoton research.

The properties of biophoton emission

After having shown that biophoton emission is a general property of all plant and animal life, Popp's team set themselves the task to show that the glow organisms gave off was not just caused by chlorophyll, thermal influence, „spontaneous chemiluminescence“, or some other „contamination effect“. In the 1970's, the American biochemist H.H.Seliger and the Russian biophysicist A.I.Zhuravlev had postulated that bioluminescence originated from occasional losses of the excitation energy that usually is used up in chemical processes, and therefore had no biological significance whatsoever. Today we know from the work of Popp's group and that of other scientists that biophoton emission correlates strongly with all the life activities of the organism by which it is emitted, and therefore very probably fulfills some biological function(s). Unlike chemical bioluminescence, before the death of an organism its intensity increases steeply more than a hundred- or a thousandfold, and then decreases down to zero at the moment of death. The radiation also increases during mitosis (cell division) and undergoes very characteristic changes during all phases of the cell cycle. It reacts very sensitively to all disturbances, external influences, and inner changes in the organism. For this reason, its measurement can be used as a reliable and sensitive indicator for such influences and changes.

The coherence of biophotons

The most convincing argument against the „degradation theory“ of Seliger and Zhuravlev however is the evidence for the coherence of biophotons that Popp and his team have provided in the course of the last twenty years. Biophotons consist of light with a high degree of order, in other words, biological laser light. Such a light is very quiet and shows an extremely stable intensity, without the fluctuations normally observed in light. Because of

their stable field strength, its waves can superimpose, and by virtue of this, interference effects become possible that do not occur in ordinary light. Because of the high degree of order, the biological laser light is able to generate and keep order and to transmit information in the organism.

In biophoton research, the property of coherence mainly shows in the „hyperbolic decay“ of so-called „induced emission“. Two types of measurement are used in biophoton research. In the „spontaneous emission“ of a sample it is practically impossible to provide evidence of coherence. For this reason the measurement of „induced emission“ has become an important instrument of biophoton research, where it is possible to determine the degree of coherence of the light emitted by the organism. Here the sample is illuminated by a short flash of light, before the researcher measures in which way the absorbed light is given off again. In doing so, he can observe that biophoton emission from living tissue shows a very extended decaying process lasting for a period of minutes to hours – something which is never observed in dead objects. Furthermore, this decay continuously slows down, such that the decay curve becomes flatter all the time and the emission never really ceases. Popp has given proof that such a decaying behaviour – which graphically is displayed in the form of a hyperbolic curve – is evidence of the coherence of the measured emission and indicates that light is stored in the tissue. Another conclusion that can be drawn from this behaviour of the re-emitted biophotons is that the emission is not originating from isolated molecules in the cells, but that the emitting molecules are coupled by a connecting coherent radiation field. A central role in the light storage seems to be attributable to the DNA in the cell nucleus which Popp's group has shown to be the main light source in the cell.

Two schools of interpretation

Today the majority of scientists working on ultraweak cell radiation still subscribes to Seliger's and Zhuravlev's biochemical view. They base their understanding on the well known physical and chemical principles of the luminescence of biological molecules and attribute the light emission to certain chemical reactions such as radical reactions and oxidation. They consider the light emission from organisms to be a mere waste product of metabolism without any biological function. Nevertheless they have developed its measurement into a useful instrument for detecting oxidative damage in organic materials, such as the rancidity of oils and fats.

Popp and his group, on the other hand, have developed another, biophysical interpretation of the phenomena based on a new understanding of life derived from

quantum optics, non-equilibrium thermodynamics, and other recent developments in science, which today is accepted by a growing minority of the researchers in the field. They do not deny that radical reactions and other biochemical processes occur and may generate some of the light emitted by organisms, but see biophoton emission mainly as the expression of an overall regulating field in the organism in which also such chemiluminescent events are embedded. In contrast to the classical, molecular view of the biochemical school, they describe the organism as a macroscopic quantum system in which not the particle aspect, but the holistic field aspect predominates. They assume that all the molecules of the organism are coupled to each other by a coherent radiation field in such a way that they form a unity in which biophotons cannot be assigned any more to any particular emitters, but must be considered to be emitted by the organism as a whole.

The analysis of biophoton measurements has shown that the emitting matter forms a biological laser mechanism, which at the same time is an experimental confirmation of the view that the organism is an open system far from thermodynamic equilibrium. This coherent biophoton field which permeates and envelopes the solid body is assumed to regulate and control all the life processes in the organism. It is a holographic field of standing waves which is able, through a broad spectrum of frequencies and polarisations and in close interplay with all material structures, to transmit signals with the speed of light to any place in the organism and to activate or to inhibit biochemical processes, to organize matter, and much more. The material structures involved in this are predestined to function as antennae for the absorption and the emission of these signals, because they possess, by virtue of their evolution in the terrestrial radiation field and their coevolution with the biophoton field, precisely matching geometries and dimensions.

The biological laser field of the organism stabilizes exactly at the „laser threshold“ where it can oscillate between the coherent mode of operation and the incoherent mode of operation, and thus combine the advantages of both regimes. This threshold is a „non-equilibrium phase transition“ (or „dissipative structure“) where the light can spontaneously and abruptly change its order. Above the laser threshold, in the coherent regime, the photon field switches over into a stable and highly ordered interference pattern in which the waves superimpose coherently. The various light sources assume a coordinated behaviour and function like a whole. At the same time these waves are amplified autocatalytically and turn into laser light. Below the threshold, in the chaotic regime, the light sources decouple and function separately. There is still coherent superimposition of waves, but it is dominated by the

absorption of light. Both regimes are necessary for the organism; for some purposes independently functioning elements are needed, for others, coordinated behaviour is more advantageous. According to Popp, this is the mechanism by which the organism regulates itself on all levels.

This hypothetical mechanism is based on the assumption that the laser mechanism of biological systems operates not only with the low-grade coherence known from technical optics, but uses the ideal quantum-optical coherence defined by Harvard physicist Roy J. Glauber around 1970. Popp believes the quantum field of living systems realizes the form of a „coherent state“, a paradoxical state with minimal quantum uncertainty that unites the properties of wave and particle, coherence and incoherence, localisation and delocalisation. All the evidence of biophoton research so far suggests that biological systems realize a form of optimal coherence that science has yet to fully understand. The measurements show evidence for the existence in biological systems of a new class of quantum phenomena recently investigated by a number of very advanced disciplines of quantum optics and electrodynamics, such as Non-Classical Light and Cavity Quantum Electrodynamics. Two of the properties identified by these new disciplines that are realised in organisms are the coherence of mixtures of wavelengths (non-monochromatic light) and the occurrence of coherence in very weak light. Recently, the Popp team has demonstrated that biophotons indeed exist in the form of such non-classical light, or more specifically, so-called „squeezed states“ which are a particular form of coherent states (Popp et al., 2002).

Biophoton measurements on humans

The emission of biophotons has not only been established for practically all plant and animal organisms. Although only a few such investigations have been realized up to now, we now know that weak, but highly coherent light is also emitted by the human body. While some earlier measurements of human biophoton emission have been made in the Soviet Union, the first Western investigations were carried out by the New York team of Richard Dobrin and John Pierrakos in the late 1970`s. They found emissions of some hundred photons per second from the chest in the UV and visible range of the spectrum. Some test persons were able to increase the emission up to 100 percent by using breathing techniques and deliberate tremblings. In 1989 and 1990, a group of British researchers obtained more than three times higher intensities in the spectral range of 420-650 nm from hands, trunk and forehead. The palms showed a much higher emission (500 photons per second) than trunk and forehead. The emission at the particular

regions of the body remained quite regular, but the team found indications for temporal variations with a maximum in the evening. In the 1990's, systematic long-term investigations of human biophoton emission with a specially developed whole-body biophoton-counting equipment were started in Popp's lab, mainly conducted by Sophie Cohen (Cohen & Popp, 1997, 1998; Cohen, Popp & Yan, 2003). The most interesting results were the findings on the rhythmicity of the emission, the significance of right-left asymmetries, and the non-local effects of treatments on the emission. Long-time measurements conducted daily over a time of more than a year confirmed that the emission of all points on the body displays a clear dependence on the various known biological rhythms (24 hours, weekly, monthly). Measurements on symmetric points on both sides of the body led to the tentative assumption that symmetric measurement values may indicate healthy states while right-left asymmetries are an indication of disturbances. Most interesting is the recent finding that the changes of the biophoton emission after some treatment were not only observed at the position of treatment, but also appeared at other places of the body. These non-local effects seem to demonstrate that the local biophoton emission is an expression of a global biophoton field of the whole organism.

A new picture of the organism

The experimental findings of biophoton research, together with recent insights from other fields of advanced science, are suggesting an entirely new picture of the living organism. First of all, as a complement to the solid body of molecules, we have an important new component or aspect of the organism to consider, namely the „electromagnetic field body“ (Zhang, 2003). From this point of view, the living organism appears as a highly complex and self-tunable resonating system of oscillating fields that are coupled nonlinearly by their phase relations (Bischof, 2003). If we consider the role of the molecules, the organism can be defined as a extremely sensitive and highly effective antennae system, able to tune itself according to need to a broad range of frequencies and polarisations. The organism is able to react sensitively to the smallest stimuli, but at the same time can also abruptly become transparent for quite strong stimuli.

Applications

Since the onset of biophoton research, various applications have been developed by Popp's group and the other labs. Because biophoton emission reflects all external influences and internal changes of an organism, its measurement in principle can be used to determine the state of the organism and for the detection and

assessment of all types of influences, even if their nature is not known. Besides the use of biophoton measurements for chemiluminescence detection, the method can be used for the detection and damage assessment of environmental contamination by all types of solid, liquid, and gaseous chemicals, and electromagnetic fields. Another application that is already used in practice is food quality assessment. Some medical applications are under development, but not yet completely ready for use. For instance, it has been found that cancer tissue displays completely different biophoton emission characteristics that healthy tissue of the same type. This could be used for developing a non-invasive method of cancer diagnostics, and also could serve to determine the optimal therapeutic treatment for a particular patient. Biophoton measurements have also widely been used to assess the effects and effectivity of various therapeutic modalities, mainly in the field of alternative and complementary medicine.

However, it is in another field where biophoton research has maybe been most influential. Biophoton theory – the new holistic picture of the organism developed by Popp on the basis of his experimental findings – is being used by an increasing number of scientists and medical doctors as an important element and stimulus for developing an adequate scientific theory of life, the need for which is felt by a growing number of them (Ho, 1993; Zhang, 2003; Curtis & Hurtak, 2004). As I have described recently, the experimental and theoretical findings of biophoton research, together with many other scientific advances, are also an important contribution in the recent emergence of a new holistic and transdisciplinary viewpoint in the life sciences, Integrative Biophysics (Bischof, 2003).

Biophoton field and visual field

As it may be of interest to the readers of this journal, as a conclusion I will allow myself some remarks concerning vision. Some unpublished observations suggest that the state of the biophoton field of a person may be connected to the tonus and geometry of the musculature and the vegetative state of the person on the one hand, and on the other hand to the state of the brain as measured by the EEG (e.g., degree of synchronisation and coherence). Advanced states of deep relaxation or certain meditative states characterized by a high degree of coherence in the EEG measurements may well be accompanied also by a high coherence of the biophoton field. I have experienced so many moments of drastic change in the visual field when in deep states of meditation that I suspect that seeing and the visual field of a person may depend on the coherence of the biophoton field of this person that perhaps could change not only the ability to see clearly but also the visibility in

the vicinity of the body. Maybe the visual field is even a property of the biophoton field itself. However, these are merely conjectures because measurements correlating

the coherence of the biophoton field and the EEG readings have not yet been made as far as I know.

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With his book „Biophotons“ (1995, 12th printing 2004) the author has written the most comprehensive account of biophoton research published in any language, but the book is in German and has not yet been translated into English. The author can be reached at mb@marcobischof.com.

Recommended publications:

Popp, F.A., Gu, Q. and Li, K.H.: Biophoton emission: Experimental background and theoretical approaches. Modern Physics Letters B, Vol.8, Nos.21 & 22 (1994), pp.1269-1296.

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S. Cohen and F. A. Popp: Biophoton emission of the human body. Journal of Photochemistry and Photobiology B: Biology, Vol.40 (1997), pp.187-189.

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C.L. Zhang: Electromagnetic body versus chemical body. Network, 81 (2003), pp.7-10.

Website of the International Institute of Biophysics:

<http://www.lifescientists.de/>

Comprehensive Bibliography on Biophoton Research and Related Subjects:

<http://www.lifescientists.de/publication/bibliography1-1.htm>

RESEARCH:

Attentional cueing improves vision restoration therapy in patients with visual field loss.

Published in Neurology, December 2004, authors D. Poggel, E. Kasten, and B.A. Sabel identify the processes and results of NovaVision VRT™ Vision Restoration Therapy by measuring visual field size in patients both in a control group (CG) and in an experimental group (EG). The intent of the research was to examine whether directing attention to areas of residual vision using a visuospatial cue also increases long-term neuronal plasticity and thus enhances permanent therapy outcomes. Analysis was made using Tubingen Automated Perimetry and computer-based high-resolution perimetry and detection performance in VRT.

Results: In the area of the cue, restoration of vision was significantly greater than during VRT-without cueing: cued patients showed a much more pronounced shift of the visual field border toward the blind area than that observed in the CG or in uncued regions of the EG.

Authors: Poggel, D.A., Kasten, E., and Sabel, B.A. (2004)

Published in: Neurology 63, December 2004, pp 2069-2076

For obtaining the study as PDF file write e-mail to: presse@novavision.de

Fenster schließen

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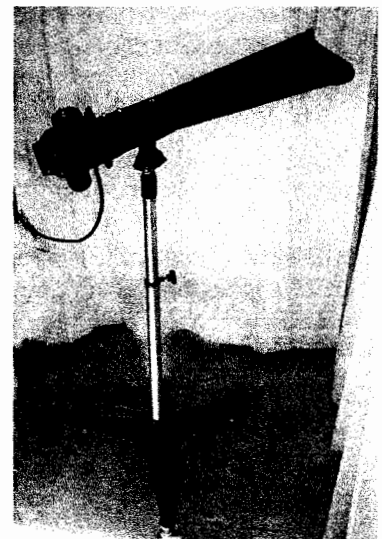
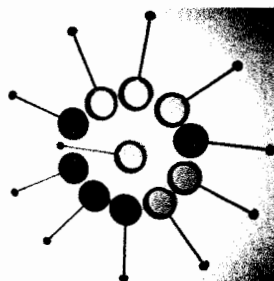
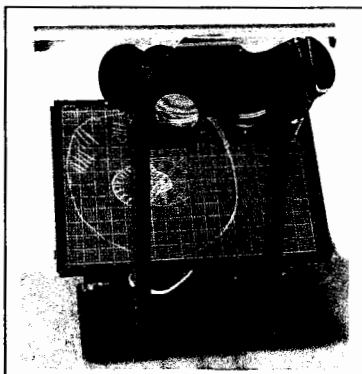
C&j Instruments has more than 20 years experience manufacturing syntonie equipment. Throughout our years serving the optometric community, C&j Instruments has enjoyed a close working relationship with the College of Syntonie Optometry. In order to give you a close look at our product offerings, I invite you to call or email for a free brochure and price list.

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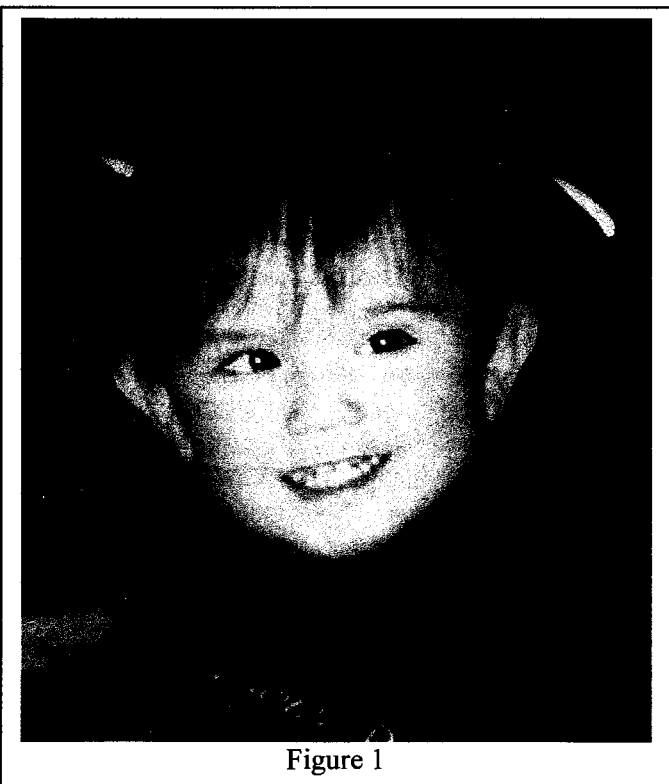
SYNTONIC CASE STUDY

STRABISMUS

By Betsy Hancock, O.D.

I first met Gabe for a vision therapy evaluation on October 15, 2004. He was three years old and already had quite a history of treatment from other eye care professionals.

Gabe was born July 14, 2001. Amniocentesis testing was performed four times during his gestation due to concerns regarding undeveloped lungs. Gabe's mom also developed gestational diabetes with the need for insulin and pregnancy induced hypertension. She was on bed rest for the last two months of the pregnancy. Gabe's mother required medications for induce delivery and Gabe was ultimately delivered by suction technique. Gabe's initial developmental milestones were normal. Between fourteen and fifteen months of age, Gabe's parents noticed an "eye turn." Both eyes alternately turned in with the left turning in more often than the right eye. Mom indicated in her notes that prior to the time of his eye turn, Gabe had fallen into the corner of a wall and hit his forehead. No adverse problems were noted. Gabe's alternating eye turn was evident (Figure 1).



In January 2003, Gabe's primary care physician referred him to a pediatric ophthalmologist who examined Gabe and prescribed the following prescription eyeglasses: O.D. +3.00 +0.50x90 O.S. +3.00+0.75x80.

This is a moderate amount of farsightedness with a small amount of astigmatism and the prescription is approximately the same in each eye. Gabe's parents obtained his glasses but Gabe was only comfortable with them for ten minutes at a time.

In March 2003, Gabe returned to the ophthalmologist and because his eye turn was not significantly lessened with his eyeglasses, strabismus surgery was recommended for both eyes. A month later, surgery was performed. The surgeon again recommended the use of prescription eyeglasses but Gabe was not comfortable with them for any significant length of time. After several progress evaluations, Gabe was still not wearing his eyeglasses for any length of time. At his visit in May, 2003, the left eye was noted to be turning in with intermittent turning in of his right eye.

In September of 2004, the surgeon stated, "The eyes are where they were prior to surgery" and another surgery for Gabe was offered to the parents and they declined. At this time, Gabe reported that he was not able to see through his eyeglasses. When his acuity was tested at his final appointment with the eye surgeon, Gabe was unable to see clearly through his left eye. The surgeon told his parents not to have Gabe wear the glasses anymore and there was nothing more that could be done. Gabe's parents were devastated.

Gabe's parents began looking for other options to help Gabe. Gabe's mom researched strabismus (an eye turn) on the Internet and came across information about developmental optometry and Dr. Betsy Hancock.

Evaluation

On October 15, 2004, Gabe presented for his initial vision therapy evaluation. Mom reported the above history plus depth perception problems on stairs. Gabe was clumsy and unable to catch a ball. He would bump

into things and had not developed skills for many fine motor activities like coloring and cutting and would quickly become impatient with these tasks. Gabe would only pursue these activities for a short time and not want to repeat them. His initial uncorrected acuity was 20/25- in the right eye and 20/30 in the left eye and his near acuity was 20/25 in each eye to Lighthouse acuity cards. When asked to fixate on a target at near, Gabe's eyes would alternate. His eyes could not work together as a coordinated team.

Gabe's eye tracking skill was poor. Gabe's pursuits or the ability to smoothly follow a moving object was accomplished with significant head movements instead of just eye movements. His eyes and head moved together. It was much the same with saccades or the ability to fixate from target to target. Eye movements were generally accomplished by head movement, as Gabe's eyes did not move his eyes separately from his head.

When visual tracking skill is poor this is often the result of a constricted visual form field. To further assess for a constricted visual form field, the alpha-omega pupil test was performed. A penlight was swung slowly back and forth between Gabe's eyes. His pupils very quickly constricted and then very quickly enlarged and became a black pupil with a little brown iris showing. This positive alpha-omega pupil test was further confirmation that Gabe's visual form field was constricted. At this point, I estimated his visual form field to be approximately ten degrees or the size of a dime. A normal functional field is 60 to 70 degrees or the size of a dinner plate.

A Cover Test revealed twenty-five diopters of alternating esotropia (eyes alternately turned in) at distance and twenty diopters of alternating esotropia at near. Mom reported that Gabe's left eye turned in more frequently than his right eye.

The presence of stereo acuity or depth perception is an important prognostic indicator for successful treatment. Gabe was only able to obtain gross depth perception with the Stereo Fly and was unsuccessful with the Randot or Titmus targets which are finer measures of stereopsis.

Due to Gabe's age, it was not possible to work in the phoropter and a prism bar was used to estimate his eye teaming ability. At distance, he was able to hold his eyes together for 18 units of divergence or turning eyes out and 20 units of convergence or turning eyes in. Gabe was not successful with this test at the near reading distance as one eye was constantly turned inward.

Formal visual form field testing in a campimeter was not attempted given Gabe's age and ability to follow the test instructions. As noted previously, the size of his field was estimated based on his visual tracking performance and response to pupil testing.

In summary, Gabe presented with poor oculomotor control (visual tracking) and limited eye teaming ability. Generally, he demonstrated alternating esotropia at distance and at near. While previous surgery often limits the opportunity for successful vision therapy treatment, Gabe's alternation of his eyes, generally good visual acuity and ability for minimum stereopsis were positive prognostic findings.

The other important positive finding was his constricted visual field. If the visual field size can be increased there is significant opportunity for improved development of binocularity and stereopsis.

Treatment

To facilitate treatment a home syntonics phototherapy program was initiated. The syntonics colors that most relate to esotropia are alpha delta (red orange) and mu delta (yellow green). As Gabe's esotropia was more long standing or chronic, the first color chosen for his treatment program was mu delta or yellow green. This frequency is in the middle of the color spectrum or balance board slightly toward the sympathetic side of the autonomic nervous system. Mu delta reflects a chronic condition which may be only visual like Gabe or also physical like chronic fatigue syndrome or fibromyalgia. That's why this filter is known as the physiological stabilizer. Mu delta will gently stimulate an under active visual system like Gabe's and open up the visual form field very quickly. An under active visual system generally has an "eso" component as the visual system pulls space inward and Gabe is demonstrating alternating esotropia. The size of a visual field often doubles in six to eight treatment sessions.

Gabe was prescribed a home therapy unit and his mom was instructed to have Gabe view the color for one to two 20-minute sessions per day. Gabe's mom often divided each treatment session into two ten minute sessions, with a short break in between. This method is completely acceptable. She was successful in accomplishing one treatment session per day.

A week after starting syntonics phototherapy or light therapy, a second functional field is performed to assess the patient's progress, checking to see if the field has enlarged. The initial field estimate for Gabe was ten

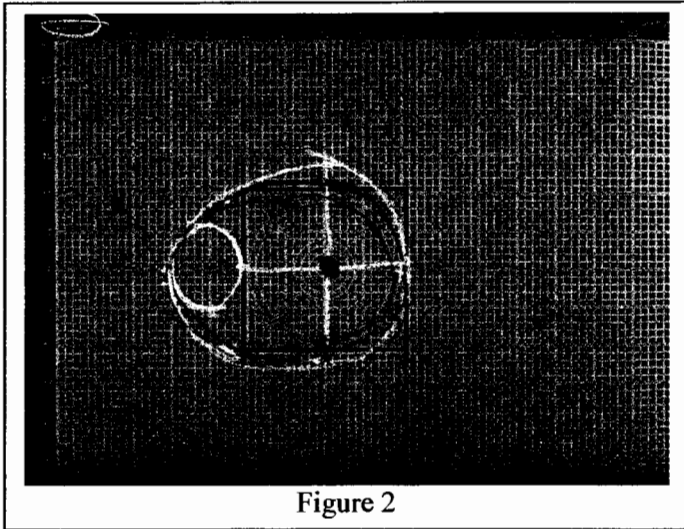


Figure 2

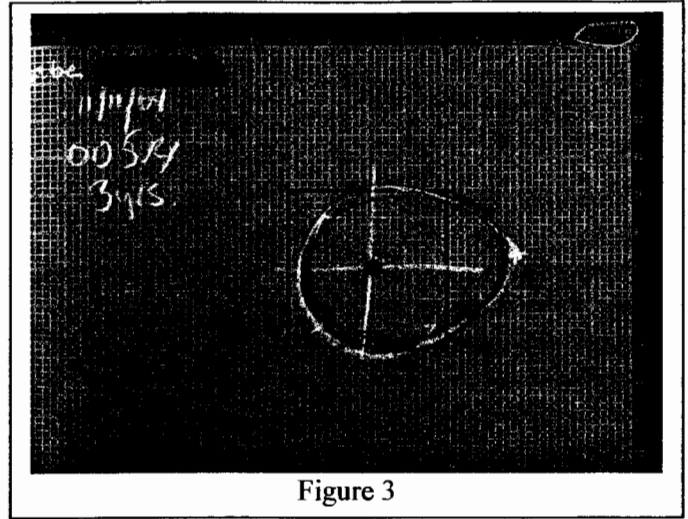


Figure 3

degrees or the size of a dime. Since Gabe was now more cooperative, I attempted a formal visual field study with him. (See Figure 2 and 3, dated 11/11/04). The right field was now twenty degrees but I was unable to measure the physiological blind spot. The left field measured approximately twenty degrees with a slightly enlarged blind spot (the smaller circle on the left).

The above doubling of visual field size was measured after five treatment sessions. Clinically, this is typical to see the visual form field enlarge significantly within the first week of treatment.

Blind spots are normal and represent the area where the optic nerve leaves the brain and connects to the eye. An enlarged blind spot is a common finding while measuring the functional field and it generally returns to normal size following syntonic treatment.

Gabe is the youngest patient with whom I have ever successfully performed a functional visual form field test. The keys here were first, a very cooperative child with supportive parents and secondly, team work between the doctor and the parent accompanying the child.

Gabe's mom kept a home syntonic record of the date, time and observations from each twenty minute treatment period. At first, Gabe reported seeing objects in the light that were related to stories being read him during the syntonic sessions. Gabe reported seeing Grandpa, snow, a green light, and Rudolph's red nose. Later he was able to report seeing two green circles a number of times at more than one session. This indicates that Gabe was attempting to see with both eyes but he was not fully fusing the images into a single circle.

When the visual field becomes enlarged past the blind spot, the patient is usually ready to accept a move out further on the balance beam of colors toward the red or more stimulating end of the spectrum. This is then followed by the yellow green or mu delta to end the session close the middle of the balance beam. Both alpha delta (orange) and alpha-omega (ruby) were considered. Gabe was tested kinesthetically and responded more positively to alpha-omega. His program was then modified to include ten minutes of alpha omega or ruby followed by ten minutes of mu delta or yellow green. Alpha-omega or ruby is the emotional stabilizer. Since it is a combination of red and blue it balances the sympathetic and parasympathetic system.

The second visual field assessment was performed on November 19, 2004 and both fields now showed measurable blind spots and overall they had enlarged significantly. The right field was almost forty-five degrees to all colors except green and the blind spot was still slightly enlarged. The visual field in the left eye was approximately forty-five degrees with the white field being the largest. The blind spot in the left eye was normal.

In further reviewing Gabe's home syntonic record, his mother noted fewer changes in the appearance of the light than the prior record. In the beginning Gabe reported the green circle was double a few times and now he reported no doubling of the target. Clinically, this indicates the fields have enlarged enough to provide some overlap to support eye teaming or binocularity. Gabe now appeared to be consistently alternating his eyes instead of favoring the right eye for fixation. This is an intermediate step prior to more stable binocular vision.

On November 30, 2004, after his fourth week of treatment, Gabe returned for his third visual field study. The visual form field in the right eye was nearly sixty degrees and the left eye fifty-five degrees in size and both blind spots were normal.

In reviewing his home syntonics records, Gabe reported seeing one orange circle several times when viewing the ruby color and single green circles. His Mother indicated behavioral changes including more controlled drawing and improved running, and jumping.

As noted earlier alpha delta or orange is a strong sensory stimulant that is the furthest out on the balance beam. This frequency is key to improving central fixation to allow for better fixation and focus skill. Since this frequency restores the ability to focus it is often accompanied by an increase in acuity or clarity of sight (reduction of amblyopia). As Gabe initially presented with esotropia and mildly reduced acuity, alpha delta or orange was added to his treatment program. He was now using alpha delta for ten minutes followed by mu delta for ten minutes.

Figure 4 is a picture taken during the fifth week of syntonics. Gabe discontinued syntonics treatment on December 9, 2004 and the re-evaluation was delayed until December 21, 2004 due to a family emergency and winter weather conditions.

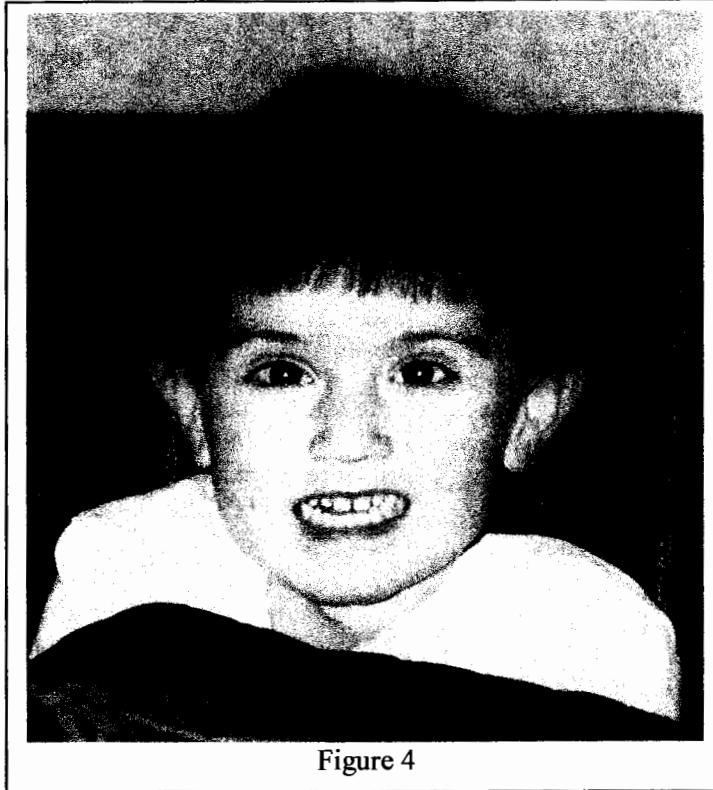


Figure 4

Re evaluation

On December 21, 2004, a re-evaluation was performed to assess Gabe's progress since completing five weeks of syntonics. Mom reported several behavioral changes: Gabe was now going down the steps easily and actually walked down the cellar stairs, which he had not attempted prior to the therapy. He was jumping and running through the house and avoiding objects on the floor. His eyes were now straight while he was watching television.

Gabe's unaided acuity was 20/30 in the right eye and 20/20 in the left eye. His

tracking and fixation improved and he was no longer moving his head to follow a moving object or to fixate a stationary object. Gabe still demonstrated some intermittent jerkiness and occasional loss of target.

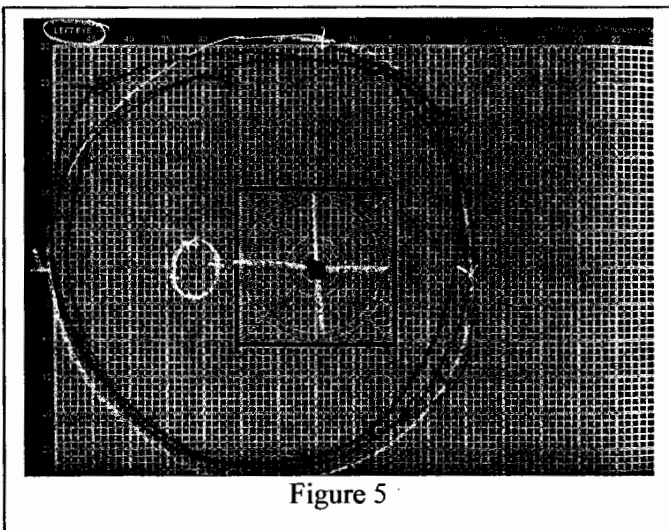


Figure 5

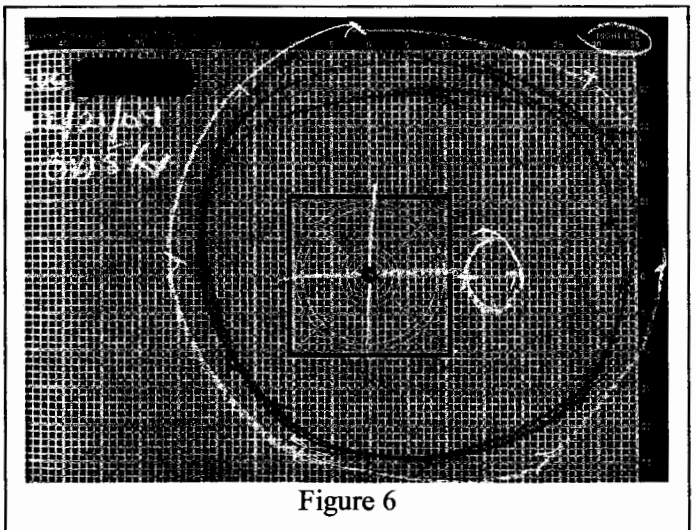


Figure 6

The alpha-omega pupil test was now normal and correlated to the fourth set of visual fields which were sixty degrees or larger. The fields had enlarged from the size of a dime to a dinner plate (Figure 5 and 6).

Gabe's depth perception also improved as he was able to perceive both the Randot Fly and the Titmus Animals.

The need for glasses was assessed using a developmental/functional approach to prescribing. The goal was to prescribe a lens that allowed Gabe to match where he needs to look (localization) with what he was seeing (identification). With a prescription of +1.50 sphere in each eye, Gabe was now seeing clearly and keeping his eyes aligned (cover testing revealed no eye turn) with a lens roughly half the strength of his original eyeglasses.

Initially Gabe was reluctant to wear his eyeglasses but his Mom reports that he is now wearing them full time in his pre-school classroom and daily at home.

Gabe later completed eight in-office vision therapy sessions with further improvement noted in his depth perception and eye teaming. He also pursued home based activities to inhibit primitive reflexes and better develop postural reflexes.

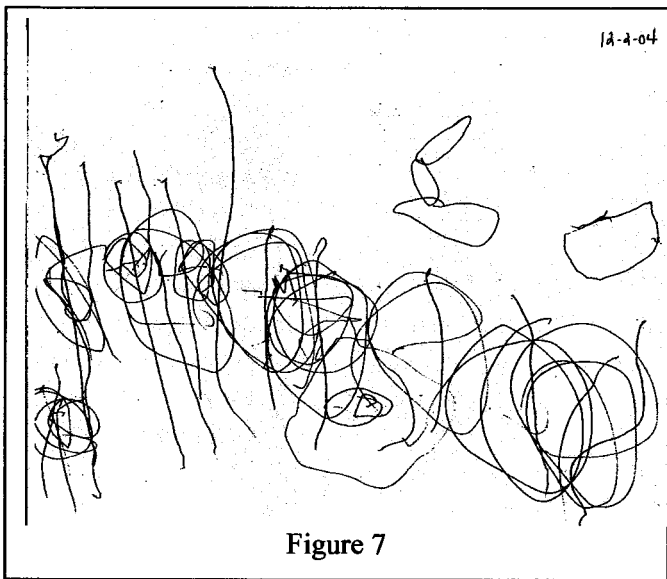


Figure 7

Drawing

According to his mother, prior to therapy, Gabe had little interest in drawing and cutting. Drawings were scribbles and not the typical figures seen at age three. Poor representational drawing is a red flag for visual motor and/or fine motor delay. On December 2, 2004, during the 5th week of syntonics, Gabe began to be interested in

drawing. (Figure7). The actual size of the drawing is a standard paper size and Gabe used the full paper available. This stage of drawing is called "Controlled Scribbling" and is typical of young preschoolers. The picture contains lines and recognizable circles which developmentally are the first forms a child learns to draw.

Two weeks later on December 16, 2004, we see a representational figure (Figure 8). There is clearly a body, arms with fingers, a face with eyes, mouth and hair, and legs with feet or shoes. This picture is representational and is called "Pictorial" and is typical of children four to five years of age. This is symbolic or representational art which is different from scribbling. Drawing is no longer for pure motor enjoyment. Every mark is purposeful and symbolic; drawing is no longer miscellaneous scribbles. In general, the human form is the child first figure as seen in this picture.

When both of Gabe's pictures are placed side by side the change in his ability level is dramatic. The first picture is typical of toddlers and the second of four to five year olds. Gabe skipped the "Basic Forms" stage typical of three and four year olds. This stage exhibits mastery of the direction and size of the line and the child draws ovals, rectangles and squares in addition to circles. When questioned at a later date, Gabe's Mother indicated that those shapes appeared several months after treatment and were being incorporated into his drawings.

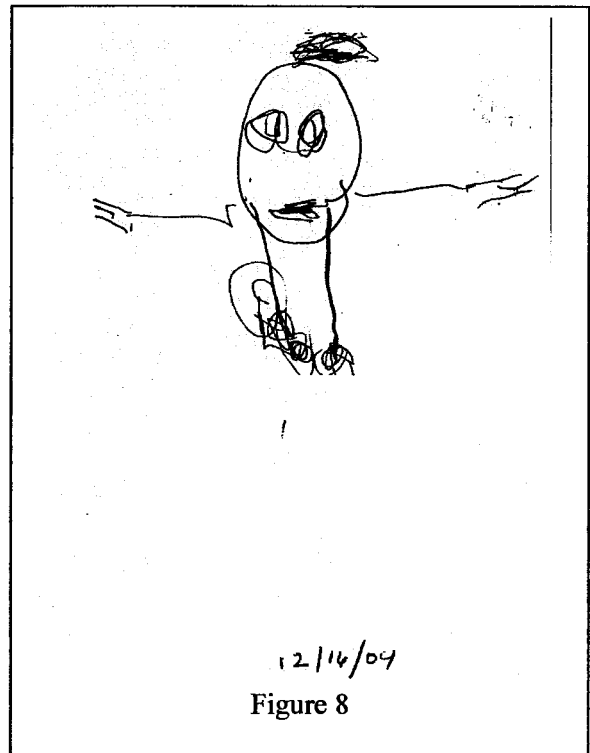


Figure 8

Breakthrough in Subtle Energies and Energy Medicine

by James L. Oschman, Ph.D.

This article was first published in Bridges, the Quarterly Magazine of the International Society for the study of Subtle Energies and Energy Medicine, 11005 Ralston Road, Suite 100D, Arvada, CO 80004; phone 303-425-4625; fax 303-425-4685; Email: issseem2@comcast.net; web: www.issseem.org.

This year our annual conference celebrates the full spectrum of the healing arts and sciences, ranging from ancient traditional and indigenous approaches to the latest in high-tech devices. At the same time, we will be exploring life and healing at all possible scales, from the level of the whole person to cells, molecules, atoms, and even to the level of the most abundant component of living matter, so-called “empty” space. The word, “empty” is in quotation marks, for modern science now sees space as more of a continuous energetic and informational “plenum” than as an empty void. Our journey of exploration thus completes a vast circle, for we cannot discuss what is happening in the submicroscopic world within the body unless we visit the larger-scale influences ranging from planetary to celestial, expressed as the properties of the space within us. Useful understandings of ourselves emerge at all of these scales of nature.

Painting this tapestry of our gathering with such a broad brush was not a design of the organizing committee; it emerged from the remarkable proposals that were submitted for the meeting. Our society is truly unique for the diversity and richness of its membership and the breadth of the conversations that take place at our conferences!

This article is intended for everyone in our is particularly dedicated to the natural healers, who have known the special gift of healing from who have found it easy to connect deeply with need of help. Some of these individuals have in science or medicine, and others find technical healing process to be daunting and even have a special message at the end of the paper for intimidated by science, technology, quantum on.

Common denominator. Many in our community there has to be a common energetic denominator to all healing, whether it is brought about by laying-on-of-hands or the latest electromagnetic healing device. At our conferences we have explored the fundamentals of energy, love, compassion, intention, prayer and touch, and of ways of objectively measuring the effects of all of them. Meanwhile, in the last few years, basic medical research has revealed another common denominator. A dramatic discovery has taken place that will forever change the way we think about our healing encounters.

Those who have studied the historical roots of medicine know that effective healing techniques predate modern science; people were healing each other long before there was even a concept of disease.

community, but it those among us an early age or those who are in advanced degrees descriptions of the unnecessary. I those who are mechanics, and so

have known that

The discovery reveals what many of us have suspected: in a sense, there is actually no such thing as disease. Certainly we have a model in which the concept of disease plays a key role. The aim of modern medicine is to diagnose the disease from the thousands of possibilities, and select the appropriate treatment.

The Karolinska Institutet University Library, Stockholm, Sweden published a list of diseases and disorders, from A to Z: alphasynuclein neuropathy to zygomycosis. In between are sandwiched 85 pages of troubles; some 3,800 different disorders and diseases recognized by modern medicine.¹ Learning all of this disease taxonomy and the biochemistry and pharmacology of each disorder is the daunting task facing the modern student of medicine.

Those who have studied the historical roots of that effective healing techniques predate modern were healing each other long before there was even disease. What recent medical research is pointing fundamental realization that the disease model, successes, has simply run its course. Like the bustle, it has had its heyday, it's successes and paradigm soon to be replaced. Our Society environment in which forward-looking thinkers of explore and create the medicine that is replacing

Living systems can be affected by many agents in many different ways, but these influences add up to modifications of one basic parameter, the density of electric polarization.

–Emilio del Giudice

medicine know science; people a concept of to is a with its many horseshoe and the failures, but it is a provides an all kinds can the disease model.

From observing the successes of many different therapists, I have come to the radical conclusion

one kind of problem that arises in the human body, one way to diagnose that problem, and one way of treating it. The common denominator is energy. All of those conditions we refer to as diseases stem from an energetic imbalance located somewhere in the body. And all of our successful treatments come from correcting that imbalance. One of the most respected researchers in the field of biophysics stated it this way:

Living systems can be affected by many agents in many different ways, but these influences add up to modifications of one basic parameter, the density of electric polarization.

–Emilio del Giudice,

University of Milan, 1990

kinds of energy that there is only

How can one make such a sweeping statement, that there is no such thing as disease? The reason is that the common denominator to all chronic disease has, in fact, been discovered and thoroughly documented, and it is energetic. The common denominator is inflammation. Inflammation is caused by free radicals. Free radicals are fundamentally electronic and energetic in nature. As del Giudice stated so prophetically in 1990, he degree of electric polarization is key.

When I think of the work of the Reiki therapist, or of the practitioner of any of the other energy methods, from A to Z (Acupuncture to Zero Balancing) I see a common thread: their techniques are, among other things, affecting the local density of electric polarization and this affects inflammation. While anti-inflammatory drugs can obviously influence inflammation, we are seeing that physical techniques are far more direct and effective. Physical techniques include all of the energy medicine approaches, ranging from laying-on-of hands to electroacupuncture to Frequency Specific Microcurrent to Pulsing Electromagnetic Field Therapy to the cold laser, as some examples.

Inflammation and repair systems. In view of the complexity of healing processes, therapists recognize that the best recovery takes place when the body itself repairs an injury or halts the spread of

disease. Problems arise when the repair systems are not working properly. Much of our health crisis results from impaired defence and repair mechanisms. Inflammation is key, for chronic inflammation disrupts the optimal functioning of the immune system.

We have had clues about this for a long time. For example, the famous German pathologist, Rudolph Virchow recognized in the mid-1800's that injured and inflamed arteries might be a source of heart attacks. This idea was given little attention until the mid-20th century, when it was realized that half of all heart attacks and strokes were taking place in people with normal cholesterol levels. In the 1980's, cardiologists began to re-examine Virchow's idea that inflammation might be the key. If this is so, a goal for heart attack prevention would be to keep inflammation to a minimum.

Two large studies, one in men and one in women, demonstrated that higher levels of C-reactive protein (a marker of inflammatory activity) correlate with a higher risk of heart attack and stroke, and treatments that reduce C-reactive protein levels reduce heart-disease risk.ⁱⁱ In an interview, the primary author of these studies, Harvard cardiologist Paul M. Ridker, stated that:

From the perspective of one favored hypothesis, we have to think of heart disease as an inflammatory disorder in the same way we think of rheumatoid arthritis or lupus in those terms... It took 30 years for researchers to agree that lower serum cholesterol would reduce the risk of heart disease, but they seem to be moving considerably faster when it comes to inflammation.ⁱⁱⁱ

Further research has indicated that inflammation markers are associated with a higher than average risk of developing Type 2 diabetes^{iv} and osteoporosis.^v The idea that inflammation is the common denominator to all chronic disease is catching fire with medical researchers around the world; inflammation is becoming one of the most active areas in clinical medicine. TIME MAGAZINE brought attention to this research with a cover story of February 23, 2004. The article summarizes the series of studies that led researchers to conclude that many if not most common chronic diseases and disorders are actually the result of inflammatory responses that have outlived their usefulness. This happens in diseases like rheumatoid arthritis, multiple sclerosis, and in many of the problems associated with aging: atherosclerosis, diabetes, Alzheimer's disease, and osteoporosis.^{vi} Likewise, inflammation has been implicated in asthma, cirrhosis of the liver, certain bowel disorders, psoriasis, meningitis, cystic fibrosis, and even cancer. In other words, inflammation, a charge density condition, is key to a wide range of diseases not previously considered inflammatory. Key evidence comes from many studies suggesting that people who regularly use nonsteroidal anti-inflammatory drugs or nutritional supplements (such as turmeric) are less afflicted by the diseases of aging than those who do not.

The healing process. The healing of physical trauma is one of the most remarkable of living injury or disease triggers the migration of a variety of toward a problem area, to fight infection and to replace A variety of factors stimulate tissue repair and then when recovery is complete. Some of these activities or even months after an injury.

The inflammatory response and the production of free essential part of the recovery process, and are activated traumatic event. The accumulation of free radicals can

In other words, inflammation, a charge density condition, is key to a wide range of diseases not previously considered inflammatory.

or emotional processes. Any kinds of cells damaged tissues. wind it down persist for weeks radicals are an immediately in a result in redness,

heat, swelling, pain, tenderness, and limitation of joint motion—many of the symptoms that bring patients to a therapist.

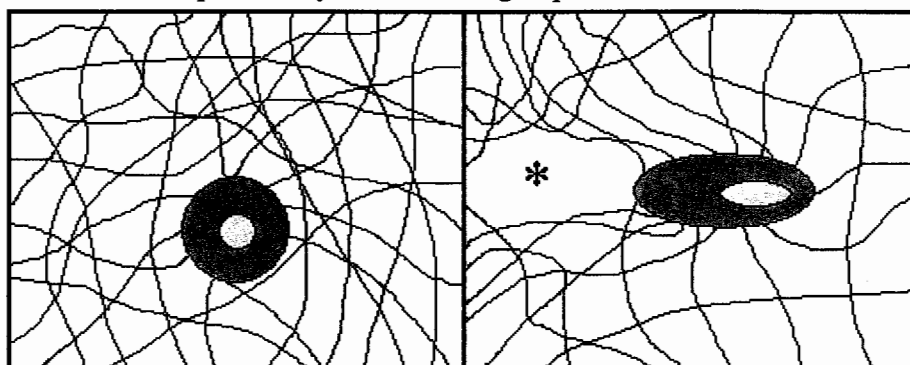
Free radicals are electrically charged molecules that are involved in all tissue healing and in many other living processes. They are unstable molecules lacking one or more electrons. Virtually all enzymes, for example, become free radicals while they are carrying out metabolic processes, such as digestion and assimilation of food. Oxygen, with its two unpaired electrons, is the ultimate free radical. Hence the cellular process of obtaining energy from food is called “oxidative metabolism.”

Electrons typically come in pairs that have opposite spins (we shall say more about spin shortly), and to restore electrical balance a free radical must grab an electron from another molecule. This changes the electronic structure of the affected molecule. The well-controlled steps in oxidative metabolism are examples of this process.

At a site of injury, free radicals carry out a demolition process that is vital to life. Free radicals destroy bacteria and viruses and cellular debris. Problems arise, though, when free radicals persist after they have done their clean-up job. This is when a beneficial acute inflammatory response turns into a persistent chronic inflammation, and the free radicals begin to attack normal cells. Free radicals can attack proteins, DNA and lipids. To prevent this, living systems have antioxidant defenses that scavenge the free radicals and render them harmless. And the body has repair systems that restore molecules that have been moderately damaged by free radicals. But when the production of free radicals continues longer than necessary, and is not balanced by the antioxidant defense systems, a serious problem called *oxidative stress* arises. Scientists are recognizing that this “inflammation syndrome” is the trigger for virtually all chronic disorders.^{vii} An enormous amount of attention is being given to the subject.^{viii} Chronic inflammation results from a failure to completely wind down the natural healing process. It is characterized by a *vicious cycle* in which residual free radicals continue to damage healthy tissues, which triggers further inflammatory responses.

As we develop, age, and accumulate experiences, our bodies are continually adjusting and compensating. Each injury, whether small or large, produces short and long-term changes in our injury repair network. In some cases, injuries that seem to have healed leave imprints upon the tissues that can become painful or cause other problems decades later. Conventional medicine looks at the symptoms and treats them. Whole Person Healing^{ix} views the whole situation, including the traumatic history. Low-grade inflammation is now recognized as part of the traumatic history. Inflammation seems to be a major contributor to chronic aches and pains that make people feel old and sick and that eventually develop into chronic and debilitating diseases. People have a continuous range in ability to respond to injury or disease, depending in large part on the amount of residual inflammation.

Cellular effects. Recent research by Ingber and colleagues^x provides a link between the emerging medical consensus that focal chronic inflammation is a common denominator to many chronic diseases, and the cellular mechanisms involved. Specifically, the swelling aspect of inflammation alters tissue architecture,



and cells “sense” these alterations. This is referred to as mechanotransduction: cellular signal transduction in response to mechanical stimuli.^{xi} Cells “think globally” in that large-scale mechanical influences on the body as a whole affect local or microscale cellular behavior. Such mechanical influences are imposed on the pre-existing force balance, or ‘tone’ of the tissue fabric. This fabric consists of the connective tissue, cytoskeletons, and nuclear matrices, collectively called *the living matrix*.^{xii} Local mechanical forces created by inflammation (* in the illustration above) then alter cell shape, behavior, growth, differentiation, polarity, motility, contractility, angiogenesis, wound healing, tumor progression, metastasis, tissue remodeling, programmed cell death, and the handling of oxidative stress.

Ingber and colleagues have concluded that many unrelated diseases, in virtually all fields of surgery, seem to have a common dependence on mechanical influences triggered by local inflammation. Likewise, many successful therapeutic approaches produce their beneficial effects by altering and local charge density.

Changing charge density in tissues. How do these affect our thinking about our healing technologies and hands-off therapies? Many electromagnetic introduce electrons into tissues, and electrons are oxidants. Here are a few examples:

Ingber and colleagues have concluded that many ostensibly unrelated diseases, in virtually all fields of medicine and surgery, seem to have a common dependence on abnormal mechanical influences triggered by local inflammation.

ostensibly medicine and abnormal inflammation. and technologies microscale forces

considerations and our hands-on healing devices the ultimate anti-

- In Frequency Specific Microcurrent therapy, electric fields are applied to the skin through conductive gloves worn by the practitioner. The fundamental discovery is that each “disease” or “disorder” will respond to a particular frequency of a very low-level field in the microampere range.^{xiii}
- In Pulsing Electromagnetic Field Therapy, oscillating currents are fed into coils placed near an injured tissue. The coils produce pulsing magnetic fields that then induce current flows within the tissues. Each tissue has a particular frequency it responds to, such as 10 Hz for ligaments and 7 Hz for bone.^{xiv} To be effective, the induced currents must be in the nano to microampere range.^{xv}
- In low level laser therapy, coherent light is projected into tissues. In one effective system, the light beam is pulsed in a sequence of different frequencies, each frequency affecting different conditions. For example, one frequency reduces inflammation, another increases oxygenation, a third stimulates lymphatic flow, and a fourth activates fibroblasts.^{xvi} The best results are obtained with a “cold” laser, i.e. the intensity is too low to cause heating of the tissues. The intensities are in the range of mW/cm^2 .^{xvii}

While the results with these devices are impressive, comparable effects are being obtained by skilled therapists using the most sophisticated healing device ever constructed: the human hand. The revolution now taking place in medicine is being brought about by rapid progress in complementary and alternative medical techniques, including both new devices and new ways of using the hands for healing. I find that the inventors of healing technologies are usually aware that their work is a stepping-stone in a process that will ultimately lead to advances in hands-on and self-healing.

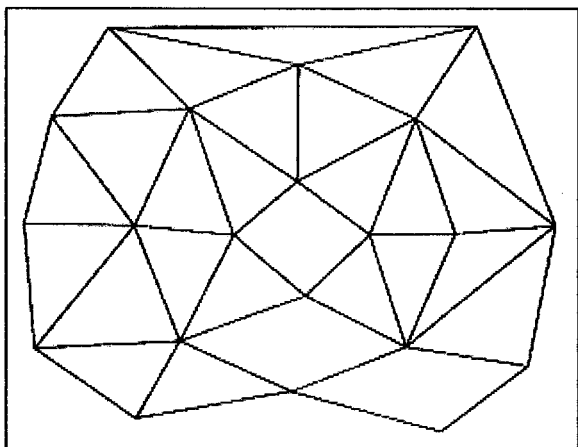
The hypothesis. How can we connect the strands that have been presented in this essay? It is appropriate to make an educated guess. Some people are afraid of making a guess because they may be proven wrong. But the experienced scientist knows that guessing is actually the only way that science can progress. In science, the name given to an educated guess is the hypothesis. The purpose of the hypothesis is not to be right, it is to

find out. The seasoned scientist is just as happy to have his or her hypothesis validated or refuted. Either way, progress occurs.

My guess is that the best of our electromagnetic the best of our hands-on and hands-off therapies bringing about changes in the degree of electric localized areas of inflammation. To understand compassionate healer is able to produce these person we will need to understand the properties tissues, and we will need to examine phenomena fabric of space. Of particular importance, I property called "spin." The pairs of electrons in spins, and what is missing in the free radical is an appropriate spin.

According to some researchers, spin is a characteristic of the microstructure of space the spin network of Roger Penrose, a description space at the Planck scale.^{xviii} The Planck scale incredibly small mass (2.2×10^{-8} kg), tiny cm), enormous energy 1.4×10^{32} degrees K), and ⁴⁴ sec).^{xix} The mind boggles at these numbers.

The illustration below shows a spin network as it constructed at the Planck scale.^{xx} For the natural intimidated by this view of the arcane world of offer comfort and a prediction. We are all need to respect all approaches. Many of us are natural healers are the ones to ask about the life, for these are the individuals who are daily and quietly and deeply immersed in every aspect the healing



process. Their perceptions extend actually far beyond the sensitivities of our most sophisticated measuring instruments. From Albert Szent-Györgyi I learned that *color* tells us about what is happening at the smallest scales, at the level of the interaction of light and matter. The human eye is the most sophisticated quantum detector in the universe. What the healer sees or senses with his or her hands during a treatment provides the most meaningful *data* about life and health. This data relates to processes taking place at the most minute levels of space, at the Planck scale. The eyes and hands are the most sophisticated sensors of the spins and vortices and resonances taking place at this minute scale. In thinking about this, I have a new respect for the therapist who describes a good result in terms of turning a person's disease or disorder into light. An exciting report by Fleming and Colorado on the spin properties of the photon encourages this perspective.^{xxi}

Whether these ideas are verified or refuted, I am certain that these are times of great discovery, and the natural healers will take their rightful places alongside the scientists and researchers and other explorers of our day. ISSSEEM is the place that nourishes this productive and mutually respectful conversation.

My guess is that the best of our electromagnetic healing devices and the best of our hands-on and hands-off therapies work in part by bringing about changes in the degree of electronic polarization in localized areas of inflammation. To understand the way a compassionate healer is able to produce these changes in another person we will need to understand the properties of the water in our tissues, and we will need to examine phenomena taking place in the fabric of space.

healing devices and work in part by polarization in the way a changes in another of the water in our taking place in the predict, is the atoms have opposite electron with the

fundamental itself. An example is of the fabric of corresponds to an distance (1.6×10^{-33} short time ($5.4 \times 10^{-$

is thought to be healer who may be quantum physics, I explorers and we recognizing that the deepest meanings of

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Stress and Reading: A Neurological Approach

By Geoff Shayler BSc FCOptom FCSO

Part 1 of this presentation considers the effects of the autonomic nervous system on the visual system's near function and investigates how the visual system is affected by stress. In Part 2, I develop a model of vision that allows an understanding of how stress affects peripheral visual function. In Part 3, I propose a change in our understanding of the processes behind near visual stress.

Part 1 The autonomic nervous system¹

The autonomic nervous system is comprised of two main parts, the sympathetic (fight or flight) pathway and the parasympathetic (regeneration/recovery) pathway.

The sympathetic nervous system

1) Visual effects

- Pupil dilation
- Relaxation of accommodation
- Divergence of the eyes
- Reduced range of clear, near focus³

The parasympathetic nervous system

1) Visual effects

- Pupil constriction
- Stimulation of accommodation
- Convergence of the eyes
- Extended range of clear, near focus

These two systems should work in accord, one relaxing whilst the other is stimulating. However when an individual is under stress there is an increase in adrenaline, stimulating the sympathetic nervous system. In some individuals, this situation becomes the "norm" with either the sympathetic system in control depressing the parasympathetic or in some cases both systems in overload, which puts the whole system under stress leading to the individual tiring easily and the whole system collapsing in a stressed state.

So what happens in the case of the sympathetic system in control depressing the action of the parasympathetic system? We get:

- Divergence of the eyes leading to low convergence, and hence a poor nearpoint
- Excessive exophoria at near
- Possibly an increased compensatory esophoria (which may be associated with myopia development)
- Reduced accommodation
- Reduced range of clear, near focus (accommodative flexibility)²
- Reduced speed of focus change (accommodative facility)
- Pupil dilation
- An inability to maintain pupil constriction when light impacts on the eye – the pupil first constricts and almost immediately dilates again, whilst the light is maintained on the eye (the alpha omega pupil)³
- An inability of the pupil to maintain constriction on convergence
- Note that a large pupil reduces depth of focus which will have the effect of increasing the demand for more specific/accurate focusing

So from this, we can see that the more stressed an individual is, the more difficult it is for the parasympathetic to adequately control all the visual functions needed for near visual tasks leading to an increasing difficulty with close work such as reading.

The functional visual field

When an individual is put under stress, the functional (dynamic) visual field collapses, commonly termed an hysterical (spiral) or malingering (circular) field. Increasingly these "common" field restrictions, found to be associated with learning difficulties⁴⁵⁶⁷, have been referred to as the non malingering bilateral amblyopia or Streff syndrome.⁸ We can describe this as a change in the threshold level of the cortical processing of the retinal nerves input.

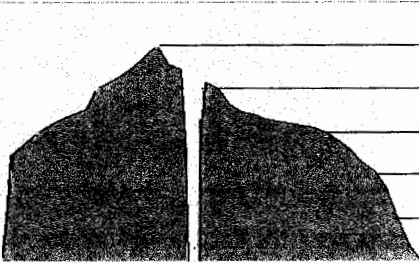


The functional/dynamic visual field

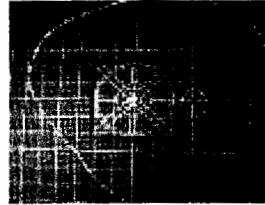
Consider the "island of vision" as described by Traquair⁹. Measuring the dynamic field of vision using different size targets, he produced an "isopter plot" of the visual field, which looked similar to that produced by map makers. The idea of the "island of vision" was developed with the peak corresponding to the macula and on the temporal side, there is infinitely deep "well" corresponding to the physiological blind spot, the area relating to the insertion of the optic nerve into the back of the eye.

In the following research, the visual field was measured using an instrument called a campimeter. This instrument is similar to a miniature Bjerrum Screen.

The island of vision

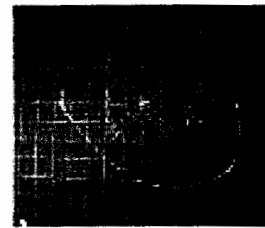
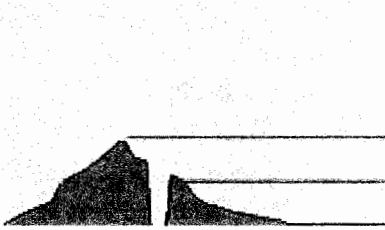


Corresponding (normal) field plot



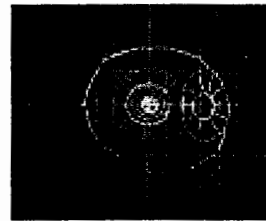
If we now look at raising the threshold, or the "island" sinking into the "sea", we obtain the following model of the island of vision and corresponding visual field plot.

field - moving threshold up

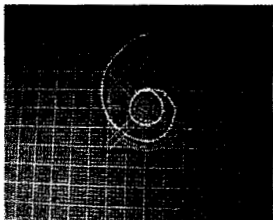


moving threshold up further

will produce this field plot -



As the threshold becomes worse, the field becomes smaller and the blind spot becomes more enlarged. (The island sinks – the field reduces). In addition there is a corresponding increase in the size of the blind spot as the field reduces¹⁰



For an hysterical field, consider the plot of a man walking around the perimeter of an island as the tide is coming in – the island will become progressively smaller until "high tide" is reached – the perimeter of the island (field size) is now a stable "malingering or Streff" type defect.

These field plots are very different from pathological field defects, which can be likened to erosion to areas¹¹ of the "island of vision". As these fields reduce, the visual acuity becomes worse. (Note: Automated field testers cannot detect *and will miss* spiral types of field defect.)

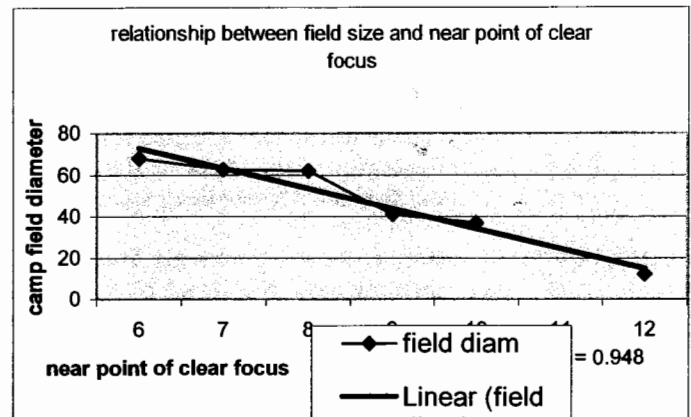
The relationship between near visual ability and the diameter of the functional visual field

I looked at the relationship between two measures of near visual performance and the diameter of the visual field (using the campimeter with a 2 degree white target –“when the patient is first aware of the white spot” as it is moved towards the centre from non seeing to seeing.).

1)The relationship between near point of clear focus and the diameter of the functional visual field

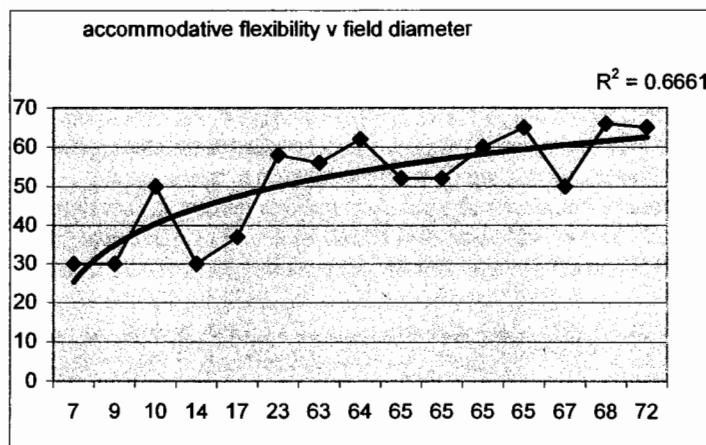
The average campimetry diameter for each measure (23 patients) of near point of clear focus (not convergence) found in the study were plotted :

The result of this graph shows a highly significant relationship. The larger the functional visual field, the closer the near point of clear focus. Small fields have a poorer (further) near point of clear focus.



2)The relationship between accommodative flexibility and functional visual fields

Accommodative flexibility is a measure of the distance between the near and far points at which small print (N7) can be read without blur. The average campimetry diameter for each measure (15 children) of accommodative flexibility found in the study were plotted .The larger the field the longer this range .Small fields exhibit restricted, limited ranges of clear, near focus.



Note that four articles published by the author^{12,13,14,15} indicated links between the near point of clear focus, accommodative flexibility and a child’s performance in their SAT results at Key Stage 1 (The Standard Assessment Tests (SATs) at Key Stage 1 are carried out in UK schools on Year 2 (6-7 year old) children in reading, writing and maths to grade their abilities)

These two studies indicate that when the functional visual fields are restricted there is a related:

- extension (worsening) of the near point of clear focus, and,
- limitation of the range of accommodative flexibility.

The Autonomic and Functional Visual Fields

As indicated above, when under stress the autonomic relationship between the sympathetic and parasympathetic is affected with over action of the sympathetic causing near visual problems associated with poor convergence, poor accommodation, increased exophoria, dilated pupils and a reduced range of clear near vision.

From the above investigations, we can now postulate that the autonomic balance is also related to the diameter of the functional visual field, i.e., over action of the sympathetic branch of the autonomic nervous system gives rise to a reduced functional (dynamic) visual field.

The roles of the visual fields

The peripheral functional visual field is:

- ❖ The control system for eye movements. Reduced fields lead to poor fixation and inaccurate saccadic eye movements. Frequently individuals with reduced fields use head movements instead of pursuit eye movements when following a target.
- ❖ The predictive system for attention and eye movements, “Where do I need to look next?” Reduced fields result in inaccurate saccadic eye movements causing problems with reading (missing out or rereading words or lines).

- ❖ Important in control of convergence. Children with reduced fields often have poor convergence or an imbalance between the convergence and accommodative systems (identifiable with Brock String). ADHD children are six times more likely to have convergence problems.
- ❖ Related to the extent of the range of clear, near vision, accommodative flexibility.
- ❖ Involved with the vestibular and proprioceptive systems in stabilising the posture of the individual.

Summary of stress on the visual system:

- 1) Poor convergence
- 2) Poor accommodation
- 3) Excessive exophoria (or compensatory esophoria)
- 4) Reduced range of clear, near vision
- 5) Large pupils which do not remain constricted when light is maintained on the eye
- 6) Poor eye movement and tracking skills. May use compensatory head movements.
- 7) Reduced functional visual fields – Streff syndrome

What happens to children in school who are having “reading problems?”

- They are given more work to do.
- They are therefore put under more stress.
- The sympathetic nervous system goes into overload.
- The visual system is set in a spiral of collapse.
- The fields close down and the child no longer has to struggle at near.
- He now simply cannot function at near!
- School becomes an unpleasant environment – increased risk of truancy / behavioural problems.
- The school gives up on this “malingering child.”
- The child gets poor grades.
- He loses confidence.
- He gets a poor job.
- He has a greater potential to become a delinquent.¹⁶

Integrated Vision therapy

Whether we consider compensatory lenses, low plus/yoked prisms, syntonics (optometric) phototherapy, occupational therapy or vision therapy, it is important to consider developing *all* near visual skill areas so that we do not just develop a “splinter skill” which has little effect in the real world. Working on reducing sympathetic stress allows the parasympathetic system to function in all areas without effort, and will lead automatically to greater near visual comfort and improved educational and occupational performance.

Part 2: Why Do the Fields Collapse?

What do we mean by functional field “loss?”

We measure a reduction of the sensitivity of the visual field which *does not have a pathological cause*. In general, there is a marked difference in visual field measurement when we use dynamic moving targets (campimetry, tangents screens, etc.), compared to use of automated flashing light threshold field tests, e.g., Henson, Octopus, etc.¹⁷ We can explain this further when we look at the brain areas associated with different areas of visual processing.

Neurological visual areas of the brain:¹⁸

Area V1 *General scanning*

Area V2 *Stereo vision*

Area V3 *Depth and distance*

Area V4 *Colour*

Area V5 *Motion*

Area V6 *Determines objective (rather than relative) position of object*

Visual pathways from lateral geniculate nucleus (LGN) include:

- 1) *magno cellular* LGN - V1 - V2 - V3 - V5 - V6
- 2) *parvo cellular* LGN - V1 - V2 - V4
- 3) *thalamic amygdala* LGN - Amygdala -
- 4) *direct motion* LGN - Area V5 -

In addition, there are numerous neural pathways that are going from cortex to LGN and LGN to retina.

There are also pathways from the retina that leave the optic nerve before reaching the LGN which include:

A pathway directly to the hypothalamus

The convergence loop

The accommodation loop Magnocellular processing : the rapid acting on-line but unconscious “where” system to direct attention for the “What” pathway.

The parvocellular “what” pathway is responsible for the detail, colour and central vision. Though parvo cells are exclusively in the fovea, they are also spread throughout the retina. This is the slower conscious “seeing” system.

Eric Hussey, O.D., has said that the magnocellular system directs the attention for the parvo system to act at a conscious level. If the two systems are not in harmony, then conscious vision cannot take place. Professor John Stein from Oxford University has suggested that there is an imbalance in the magno/parvo systems in dyslexic children.²⁰ Thus it may be appropriate to consider-

1. Threshold visual testing as basic Area V1 and V2 processing
2. Functional (dynamic) motion field as Area V5 (perhaps a combination of magno and direct LGN to V5 processing)
3. Colour fields to be a function of parvo - Area V4

Because of the increased complexity of visual information being processed, the (1) field above will be the largest field and (3) the smallest., i.e., each type of visual field test is not perfect on its own, but should be considered as an indicator of an extremely complex part of brain function related *to specific visual input*.

This may help to explain why a child with a small functional visual field, perhaps less than 5° may be seen to be able to run around quite happily, just being a bit clumsy, whereas the late stage glaucoma patient with this size field needs his “guide dog” to help him around. The ophthalmologist seeing this child, despite measuring a small field, dismisses it (the field) as being ridiculous, “That child’s fields cannot be that small. He just walked in through that door and came and seated himself in my chair. He could not do that if the field were as measured.” This child may not be aware, at a conscious functional level of his peripheral vision, (i.e. a measured small field), but he does have direct neural links between the eye and Area V5 (motion) and from eye to amygdala (emotion). So he is able to utilise this information at a subconscious level, despite not consciously using it, having bypassed Areas V1 and V2. Perhaps the conscious processing at Areas V1 and V2 are needed to allow or initiate conscious processing in the “higher” visual areas.

Neural Synchronisation

Previously I have intimated that the fields close down in response to a change in the threshold needed to stimulate vision. I have also suggested that it is the over stimulation of the sympathetic nervous system that causes these changes. Can we now postulate a hypothesis that could allow this to occur?

There is no single area responsible for assimilating information processed in the brain. At any one time, there is simultaneous multiple processing and integration of information of multiple elements in numerous brain areas. Every second, millions of neurons are firing and transmitting to millions of other cells both inside and outside the brain.

When we look at EEG, ECG and heart rate variability charts,^{21,22} it can be seen that the graphs in each case are smooth and flowing when the body is functioning normally, but jagged and erratic when the body is diseased or stressed. If these tests are each measuring electrical output of these millions of neurons, then how do the impulses combine to produce such regular, (or irregular) patterns of measurable electrical activity? Is it logical to suggest that we will measure a smooth and flowing electrical output if the neurons are firing “in-phase” with each other, and, if the individual is under stress, that the neurone firing becomes out of phase and the ensuing chart will be more erratic?

Bio-photons

Research by Popp,^{23,24,25} and others, since the 80s, has indicated that *all* cells absorb *and* emit light. In addition unless the cells were cancerous in nature, the light emitted was the same frequency as the absorbed light. It has been suggested that the origin of this emission is from the actual DNA in the cells. We can consider the DNA to be the control system of cell (and organism) development, specialisation and establishment within the organism of which the cell is a part. How do cells develop? How do they know of their specific speciality? How do they know how they need to relate to other cells? etc., etc.

Could it be that cells are able to communicate by the emission of these “short life” bio-photons? Light communication would be extremely fast, 1cm in 3.05×10^{-12} seconds and could perhaps prepare cells for action prior to communication by the slower electrical or chemical neural pathways. William Hamilton quoted in article on the internet²² “The holographic biophoton field of the brain and the nervous system, and maybe even that of the whole organism, may also be basis of memory and other phenomena of consciousness, as postulated by neurophysiologist Karl Pribram and others”.

Light as a wave form

When we consider light (photons) in wave form we can see from “grating” experiments that waves out of phase cancel each other out. Coherent light such as that produced by lasers do not interfere with each other and thus can travel large distances with little dispersion. Normal non-coherent light (from an ordinary light bulb for example) does not travel as efficiently due to general dispersion and absorption.

Light in the brain

To return to our concept of biophoton emission, if the light emitted by cells is out of phase (non-coherent) with light being emitted from other cells, then these photons may negate each other. If the organism is under stress, in sympathetic nervous system overload, then the “neural biophoton emission” is likely to be less controlled or more erratic leading to some of this output being effectively cancelled out. The more stressed the individual, the fewer biophotons will be effective in their transmission to other cells. These cells will then need a greater stimulus to trigger their action. This hypothetical concept would explain why when an individual is mentally stressed we measure erratic electrical neural activity as measured by EEG, heart rate variability etc.,

A return to vision

When we look at the function of the brain in vision, there are millions of neurons that have to simultaneously process and react to stimulation that was started by light impacting on the retina of the eye. As a result of light reaching the back of the eye, there are at least three ways that that light can be used :-

1. Stimulation of the rods and cones by the action of the light on these photo sensitive cells triggering chemical and electrical changes in the optic nerves to send “information” about the world, to the various cortical areas of the brain.
2. Intracellular stimulation of the DNA by photon energy, which will later be re-emitted according to DNA demand to other cells as required to prepare them for the slower neurological stimulation by (1) above.
3. To energise the blood. Haemoglobin has been shown to have a similar chemical structure to chlorophyll²⁶, the essential element that allows photosynthesis in plants. Some researchers have indicated that haemoglobin not only carries oxygen, but also transmits “light energy” throughout the body

Retinoscopy

Paul Harris, O.D. Robert Hohendorf, O.D. Gregory Kitchener, O.D., Kenneth Koslowe, O.D. and Robin Lewis, O.D. quoted, in an article (published by OEP) on Retinoscopy²⁷, that “Optometry is a unique profession. One thing that makes optometry unique is how we use light to gain insights into both the potential and actual behaviours of a human being”.

A further quote from the same article “Stress Point Retinoscopy grew out of a series of observations made by Darell Boyd Harmon while working with Robert A. Kraskin looked at changes seen with a spot retinoscope used at the patients’ Harmon distance. Unlike nearly all other retinoscopy techniques here the scope was not moved but was held stationary, centered in the exit pupil of the patients’ eye. A target was moved toward the patient and changes in luminance, (some claim color variations as well although as luminance changes the color temperature of the light will change) are observed as the target is moved towards the patient” What Harmon and Kraskin also found was that lenses could change the location in space where the patient made the shift from flight to flight.

Could this indicate that the reflection of light from the retina is :-

- a) dependant on the emotional / neurological balance of the individual, and,
- b) related to reflection and emission of light from the retinal cells
- c) which would indicate a change in emission of light from the cells dependant on autonomic neurological balance?

If efficient multi linked neurons to neurons connections are dependant on prior biophoton stimulation, then we can consider the following :

1. For efficient neural function, we need efficient coherent biophoton inter neuron pre-stimulation.
2. If an individual is under stress, there will be an increase in the number of photons being cancelled out as they are out of phase.
3. The effect of this is to reduce the numbers of neurons available to send “signals up the line” to higher level processing.
4. If a neuron requires several neurons to stimulate it before it fires and sends “information” on, then this cell is less likely to fire as it is now receiving an inadequate stimulus.
5. There will therefore be fewer “higher level” neurons ready to function.
6. The processing of the visual field requires huge numbers of neurons to simultaneously process information.

7. The farther we go into the periphery the higher the stimulus is needed to trigger a conscious response (the island of vision).
8. If less higher level neurons are firing, there is going to be an increase in threshold needed for conscious processing leading to a reduced functional field of vision.
9. The functional visual field becomes restricted when an individual is under stress.
10. Stress leads to change in threshold levels leading to reduced functional fields.

¶
In summary:

- 1) The greater the individual is under stress, the more likely it is that the biophotons will be out of phase causing fewer higher level neurons firing. This in turn leads to a change in threshold of conscious processing demonstrated by a reduced functional visual field of vision.
- 2) This construct of vision is not intended as a scientific factual explanation, but as a model, which gives us a way of understanding how and why vision fails when we are under stress.
- 3) With this understanding of the effect of stress on the visual system, we can start to understand why so many of our children are failing in school today
- 4) This model may also be used to indicate why syntonics phototherapy is so successful in expanding these reduced visual fields as the neural pathways, cells, DNA, etc., are being stimulated by appropriate "single" colours (frequencies) of light allowing the system to stabilise and become balanced.

Part 3 Changing our understanding of neurological function

In part 1 of this presentation I considered the effects of stress from "known" neurological understanding of the autonomic nervous system. From observation and research, I have shown the links between near visual stress and the functional (dynamic) visual field. In part 2, I put together a model of how this effect may occur, and whether we look at the concept as biophoton emissions or nerve impulses being in or out "of phase", this does give us a concept to build on to explain this phenomenon. Here in Part 3 I want to turn the concept around.

Consider what would happen if stress *simply affects the threshold values of the visual field* – in this scenario the following could happen :-

- 1) We would get a reduced functional visual field.²⁸
- 2) In order to stimulate the retinal and cortical cells to fire, there would need to be an increase in the power of the initial stimulus. This would be achieved by enlarging the pupil, allowing more light to impinge on the retina.
- 3) With a reduced field there is less higher level peripheral processing taking place which would reduce the demand and ability for the brain to align and integrate rotation (fixation difficulties) of the eyes, leading to an increase in compensatory head movements, and decreased convergence of the eyes (low convergence – increased exophoria).
- 4) There will be reduced fusional reserves.
- 5) Without peripheral processing the demand for accommodation will reduce, etc.
- 6) In other words, all the problems previously outlined in this article are involved in near visual stress.

Hence it may appropriate to consider that the effects of nearpoint stress are directly linked to a change in the retinal and conscious cortical neuron firing thresholds, which will directly affect all the other areas. It is this primary change in the function of the visual field that leads to eye movement difficulties, convergence, accommodation, pupil constriction anomalies, etc., which leads to the problems encountered by many of our children in school In this concept, it is therefore imperative that primary therapy should be directed at expanding the visual fields.

As an example, these effects can be easily and immediately subjectively and objectively observed when prescribing appropriate low plus and/or yoked prisms²⁹ in suitable individuals.

1. These lenses give an increase in the measured field, identifiable by observation of the MacDonald form field test or campimetry
2. Expansion of reading range,
3. Improved eye movements which can be measured with eye track devices,
4. Improved convergence,
5. Less strain visible on the patient's face,
6. Improved reading speed, accuracy and comprehension.

However, in general, these lenses, like Irlen lenses, only help whilst they are being worn. They are a "crutch to relieve strain." In some instances, they are therapeutic in that they show the brain it can relax and function normally, thus allowing the fields to expand to normality.

For those with seriously reduced fields, the expansion of fields with syntonics optometric phototherapy^{30,31,32} demonstrates speedy recovery to normal visual function, especially when united with an integrated vision training program³³

Biotypes, Gender and Frequency

By Sarah Cobb

“The general make-up and the biotype of the individual have been shown to be a function of the central gray in the brain acting through the autonomic and the endocrine system.” (Spitler)

The concept of the biotype did not originate with the early pioneers of syntonics but they were decidedly influenced. Spitler quotes Leo Loeb¹ in Syntonics Principle² that the response of biotypes extends even to the responses of cells and tissues, indicating the cells themselves could be classified as *asthenic*, *syntonic* or *pyknic*.

Spitler addressed biotypes during the process of refining syntonics frequencies that applied to treatment of the visual system. His writings, as those of his teacher Dr. Carl Loeb³, devoted a separate chapter to the subject. Everything from the head, facial features, the personality and body type were analyzed. The more the individual fit the basic paradigm, the more out of balance the autonomic nervous system. Spitler actually measured it with a syntonometer, pictured.

Spitler cites Psychology of Emotion by Kretchmer⁴ for linking biotypes with personality characteristics, and McCurdy⁵ with the fact that the *male tends towards asthenic while the female tends toward the pyknic*. Usually children are *pyknic*. According to basic syntonics doctrine, the *pyknic* is generally a good natured female type who is stable, seeks comfort, dislikes mental activity, is slow moving and slow to anger. The *asthenic*, is generally the energetic male type who is introverted, worries, plans, is restless, mentally overactive, quick to anger and has few friends.⁶

In morphological analysis the female *pyknic* is generally expressed as fullness of the head, face cheeks and lips with even teeth whose eyes are small

and far apart. The male *asthenic* has large eyes and narrow head with a thin, pale, triangular face, long neck and extremities.⁷

Extreme biotypes, according to Spitler manifested visually as well. Hyperopia and esophoria were associated with the *asthenic* male biotype while myopia and exophoria tended to match the vibratory pattern of a *pyknic* or female biotype whose accommodative system was more active than in the *asthenics*.⁸

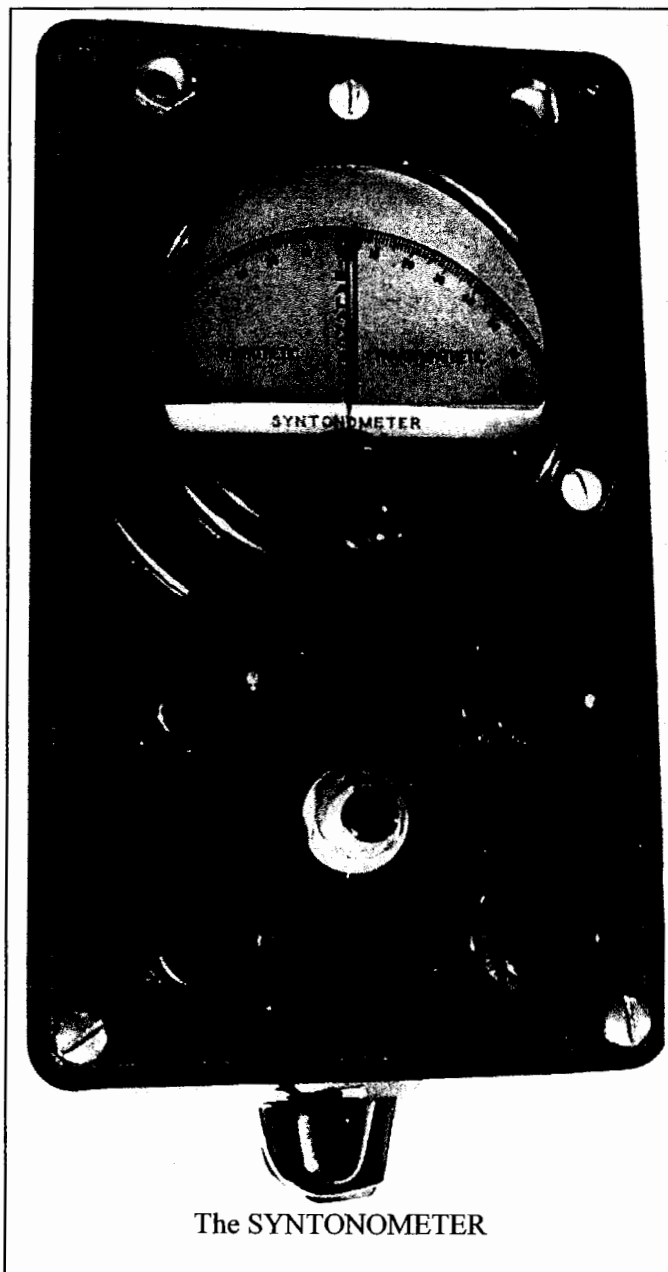
The sympathetically dominate *asthenic*, became ill because of an over-activity of the red velocity in his system, but was easily relaxed. The balanced, *syntonic* type rarely got sick. The parasympathetic dominate *pyknic* had a vibratory rate overbalanced in light oak yellow that caused his system instability both mentally and motorically. According to Carl Loeb, *pyknics* reacted very quickly to stimulation.⁹

Because of this inherent over or under-activity of the nervous system, the frequencies that were applied to the case in the early days of syntonics optometry were adjusted to accommodate the specific biotype.¹⁰ Classic syntonics doctrine notes it this way: Pyknic leaning towards syntonic was abbreviated P/S. Syntonics leaning towards pyknic S/P. Syntonics leaning towards asthenic S/A. Asthenic leaning towards syntonic A/S.¹¹

Dr. Carl Loeb wrote, “One of the great fundamental causes of diseases is over-activity of one part of the body at the cost of under-activity of another part. The under-activity is usually the cause of complaint. Yet, the majority of physicians hardly ever realize that they would get quicker and better results if they would treat the too actively functioning organs by inhibiting them instead of stimulating the impaired under-active functions.”

Take for example an acute condition. Diplopia, caused from a recent head injury or stroke is treated by the modern syntonometric optometrist with blue/blue green (upsilon omega/mu epsilon). Spitler would have considered the biotype and recommended for a *pyknic* * female type, turquoise/cobalt blue, green/turquoise (pi omega/mu pi), substituting pi for epsilon. For a male *asthenic* type epsilon omega/mu epsilon would have been applied. However, in both cases, the combination of blue and green frequencies would be used to treat the underlying cause of the diplopia, trauma to the autonomic nervous system.

The largest category of syntonometric applications involves treatment of less acute vision problems associated with chronic conditions aggravated by stress and toxicity. Prescribing lime green (mu delta) is offered with ruby (alpha/omega). But Spitler would only have suggested those frequencies to an *asthenic, male type*. For a young child or person with more "female" energies, *pyknic*, green/yellow, (mu / theta) instead of green/amber (mu/delta) would have been prescribed, cobalt blue (omega) and red (alpha) are neutral .



The SYNTONOMETR

substituted for delta (amber). *Pyknics* are prescribed pi (turquoise) instead of epsilon (blue).¹²

There is no question that whether the biotype is considered in frequency decisions or not, the practice of syntonics is the most effective way to treat vision problems. In an article written for the "Western Optical World" October 1933, Spitler discussed his efforts to bring syntonometric phototherapy to optometry. "Almost twelve years were spent in

developing the method to its present state. Hundreds of ocular, biologic and physiologic experiments have been performed, checked and rechecked, before the technic was ever shown or taught to another optometrist. Even now the technic is not perfect and may never reach perfection. Nevertheless it will do as much or more for esophoria, exophoria, squints, hyperphoria, amblyopia, asthenopia, pseudo-myopia, progressive myopia, certain types of opacities, low reserves, abnormal hook-up between accommodation and convergence and other purely optometric conditions, than any other technic in optometry. This sounds like pure bombast...It seems to be the lot of those who pioneer to have to endure a certain amount of adverse criticism. In fact, criticism should be invited. But to be of value such criticism should be made only after a personal study of the subject rather than voiced on mere hearsay or biased prejudice."

Little has changed.

In summary, alpha (red), omega (cobalt blue), and mu (green) are applied to all biotypes, but with parasympathic dominated *pyknics*, theta (yellow) is

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The New Process Color Theory

By Steven R. Vazquez, Ph.D.

Process color theory focuses upon the moment to moment experience of the interplay between color and the human response to it. I originated this color theory as the foundation upon which Emotional Transformation Therapy™ (ETT™) is used. ETT™ is an extraordinary form of psychotherapy that uses powerful techniques of visual brain stimulation to gain unprecedented access to dissociated emotion and information and then rapidly relieves it. Process color theory is aligned with some views from process philosophy, which conceives of reality as being constituted of time, process, and becoming rather than unchanging substance. This perspective has been advocated by philosophers such as Henri Bergson, Alfred North Whitehead, Pierre Teilhard De Chardin, and Charles Hartshorne. This viewpoint holds that the universe operates as “creative, interdependent processes that give and receive to one another” resulting in “growing together into an ever more complex unity” (Gentz, 1986). The idea that the universe and specifically the human species are continually evolving is a premise central to process philosophy. This evolution is not exactly the same as Darwin’s version but instead suggests that our species is undergoing a change into a higher spiritual evolution. Certain universal elements of nature such as light and color possess attributes that are powerful catalysts in this evolution. Therefore, process color theory differs from other color theories in several fundamental ways.

Classification of Color in Theories

In 1931 the International Commission on Illumination defined red, green and blue as the three primary colours from which all other colours are derived. The complement of one of these colours is the mixture of the two others in the triad. . . Hue, saturation, and brightness are identified as the features that distinguish one color from another.

(Encyclopedia Britannica, 1988) This standard of color theory classifies colors according to (1) how colors mix, (2) how colors relate to each other, (3) how colors are perceived in variance and intensity. While this conception is very logical, it provides little functional relevance regarding the interplay between color and human response. Process color theory focuses upon the role of color in human change.

Most color theories utilize forms of treatment that are symptom-remedy approaches, which parallels that of conventional medicine. This symptom-remedy approach tends to assume that a specific external substance or form of stimulation should provide a remedy for each specific symptom. An implicit assumption in this approach is that there must exist a “magic bullet” medicine that should “fix” a symptom without repercussions for the rest of the mind-body system. This symptom-remedy approach assumes that because the same symptom occurs among different people, that the necessary remedy will also be the same for different people. In this approach the role of the provider is to evaluate the patient and then provide external remedies. Therefore, the symptom remedy approach requires color theories that divide and separate colors according to how colors match with each separate symptom.

ETT™ and its process color theory differ from symptom-remedy principles in several ways. First, ETT™ advocates that both internal and external resources are available to resolve problems and that the interplay between the person and external color resources is central to complete healing. Instead of a magic bullet, a synergy of treatment factors along with color is usually necessary in order to achieve an in-depth systemic resolution. My approach does not assume that the same symptoms require the exact same interventions because the symptoms are seen in the context of the whole person and his/her relationships. Instead of

the treatment provider being a detached observer, the bonding process between the facilitator and the client, as well as the bond between the color and the client, are major factors in the intervention.

The use of powerful visual techniques during color stimulation tends to elicit thoughts, emotions, physical sensations and memories that were previously not consciously known to the viewer. Therefore, if I use a protocol of colors A, B, and C, the person's issue and symptoms may change due to color A and no longer necessitate color B. It may be that an entire shift in the protocol is necessary requiring colors D, E, and F. Psychological matrices tend to emerge rapidly in layers that may have an entirely different cluster of physical symptoms. For this reason, process color theory tracks tendencies of chains of reactions because certain symptoms progress in predictable sequences. Therefore, we are interested in the process of the unfolding of patterns toward alleviation and growth. This means colors are selected for their value in catalyzing matrices of experiences that proceed along specific pathways that take a person from symptoms to alleviation to well being. Computer programs, formulas or recipes cannot often do this type of facilitation because moment to moment processes are strengthened by human compassion and decision-making.

Balance or Growth?

Another popular type of color theory classifies warm vs. cool; active vs. passive; or the red to yellow vs. the green to violet range of colors. This type of division often uses colors to palliate symptoms by using the "cool" colors to reduce sympathetic nervous system activation or "warm" colors to activate the person from parasympathetic nervous system dominance. In terms of symptom management, this strategy can work if the goal is to achieve "balance" or homeostasis. However, in many cases this approach does not address moment to moment change or human growth. For example, when a person falls in love, wins a hard fought victory or experiences a profound insight, that person is not likely to be "balanced." Instead, people in these states of mind are significantly destabilized. While certain people who are chronically unstable may temporarily experience balance as growth, forward movement is more often "out of balance." Process color theory focuses on

the role of color in the human experience of change. This results in a more individualized selection of color according to how it interfaces with the unique attributes of each individual at a given time to enhance forward change.

Another popular color theory concerns the Indian chakra system. This theory focuses on energy vortices located within the physical body and that have personality or psychological attributes associated with each color. While there are different chakra theories, one of the most popular ones identifies seven chakras that are aligned with each color. Process color theory differs from this in that colors are seen to operate on a continuum from red to violet. This continuum of color along the natural spectrum causes the selection of the optimal color for a given issue to often correspond to physical areas located between the chakra centers. In other words, it overlaps with chakra theory but is not the same.

The Origin of Process Color Theory

This process color theory was derived from observing hundreds of people processing their responses verbally while viewing a variety of colors one at a time. A content analysis of these responses revealed specific patterns of mood, cognitive themes, and physiological responses that consistently arose in conjunction with each color. Colors are classified according to the emotional themes and physical vicinities that consistently resonate during the interplay of color and human response. To resonate is to manifest sympathetic vibration. This resonance can elicit either a "contaminated" or "uncontaminated" reaction depending upon how progressed the viewer's emotional development and/or physical functioning is in regard to the evoked theme. In other words, a person who has not resolved certain emotions may experience these emotional disturbances as they encounter particular colors. An uncontaminated response to a color would yield a more comfortable or even joyous response to that same color. However, these findings are complicated by the fact that the response to color can be learned by association. This means that if a strong negative experience is paired with viewing a certain color, a new response may be learned to this color. By this means, any color can literally result in any variety of

responses. Therefore, responses to colors can be highly individualized and moment to moment feedback to each color allows for a very precise use of colors in treatment.

Chaos Theory

These types of changes can be conceptualized in a type of process philosophy used to describe complex systems, known as chaos theory. Ilya Prigogine won the Nobel Prize for his elucidation of chaos theory. In chaos theory one of the principles used is that of an “attractor,” which is “a state or pattern of activity toward which a system tends to slide of its own accord.”(Combs, 2002) For example, if a ball is set in motion to roll on the flat earth it will gradually slow down until it stops. This resting state is termed a “static attractor,” because it represents the position to which the ball is drawn. Processes like mood states are unpredictable in the strictest sense, but their overall patterns can be identified and a rough accuracy can be predicted about their future progress. Colors can be seen as catalysts for emotional theme attractors that compel progress through emotional and physical chaos toward states of growth. The overall patterns of the sequential progression of affective change can roughly be predicted when the appropriate color is matched with the viewer’s specific state of mind. Through this process, color in the form of light energy encourages the human system to reorganize itself into increasingly higher orders of complexity. In doing so, the changes in our systems create disorder or entropy as a by-product. These changes ultimately lead to the evolution of a human system.

During the process of change, chaos is literally seen in the visual distortion when viewing a radiating light source. The fluctuations of inner turbulence are revealed visually. The response to a color during the viewer’s expression about specific issues provides evidence, in the form of visual distortions, about whether that color resonates with the viewer’s issue. For example, people who possess anger tend to report reactions to viewing yellow such as describing the light to appear “intrusive, annoying, appearing to be too bright,” or looking “reddish yellow.” When changes in the viewer’s own emotions occur, an accompanying change in the viewer’s visual perception of the color also takes place. Then after the resolution of an

emotional issue, the response to yellow, for example, tends to become “softer looking” and appearing “more clearly yellow; no longer intrusive.” Through a client’s reports of visual feedback, a facilitator is provided moment to moment information about the client’s state of mind. With this data, a trained facilitator can make decisions about interventions much more accurately and quickly which results in accelerated progress of the client’s growth.

The Uncertainty Principle

The interplay between color and human consciousness is strongly supported by the scientific findings of quantum physics. Through experiments conducted with light, physicist Werner Heisenberg developed the uncertainty principle which shows that the observation of light influences light itself by virtue of the interaction (Heisenberg, 1972). Therefore, the interplay between color and human response occurs much like two live entities influencing each other. When a treatment provider selects a color for use, it is often an erroneous assumption that a particular color has fixed attributes which can be relied upon for the same effect with different people who bring different perspectives to the viewing process. When the optimal colors are selected for viewing, the interplay between color and human consciousness potentially creates novel gestalts of consciousness. A trained facilitator can capitalize on the changing process by changing colors and visual techniques to match the newly created types of consciousness.

Outcomes in Process Color Theory

Process color theory is first and foremost very functional in that it is based on experiences of actual people who experienced profound mental and physical improvements very rapidly. The impact of viewing color has been dramatically potentiated by several recently discovered visual techniques (Vazquez, 2004). Breakthroughs in the rapid treatment of depression, seasonal affective disorder (S.A.D.), trauma, and anxiety disorders have highlighted the use of ETT™. Physical conditions such as physical pain, injury recovery and illness have also been consistently and powerfully impacted with ETT™.

The direct visual contact with light in all its manifestations of color can become a spiritual

experience. When this happens it occurs in a process. An insight, an ecstatic experience, a numinous awareness, all occur in the context of a transitory event. We cannot capture the event but light stimulation can increase the frequency and quality of these occurrences. These events have the potential to change us in lasting ways so that we may never be quite the same. Process theology is based on the concept that the divine is experienced in process. While the term "light" is used to symbolically refer to the divine in every major religion on this planet, it also has a literal meaning. In 2004 we achieved the ultimate by purposefully facilitating enlightenment (in the Hindu/Buddhist sense). This almost indescribable experience ushered a research volunteer into states of harmony for a full two-week period to levels of wellbeing beyond anything she had ever experienced. This two hundred and eighty pound woman suddenly became physically agile, slept better than ever and possessed abundant energy all day long. She operated with uncanny harmony in relating to others and was

equally at peace when alone. This previously guarded person became spontaneous, confident but at the same time totally at ease and trusting of life's process. Love and joy became the norm for her as the spiritual manifested in her everyday life. This experience of being one with the universe constitutes a leap in ones spiritual evolution.

Our human systems are literally made to access light for the promotion of our progressive development. Our natural visual environments tend to be rich in color. Process color theory includes detailed charts that catalogue colors according to a continuum regarding the manner in which colors activate potentials. However, the more important keys relate to how one can facilitate processes to unfold these natural potentials. When we can participate in the full interplay with color, our visual environment can be used to enhance our evolutionary destiny.

Dr. Vazquez's website: www.lightworkassociates.com

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AUTONOMIC NERVOUS SYSTEM AND LIGHT FREQUENCIES

By Frances A. McManemin, PHD

The use of color and light to remediate and bring balance to human functioning dates at least to the Greeks, who used both colors and sunlight in the temples and medical treatment centers (1). Reports of the use of colored light to treat a variety of ocular and physiological ailments have grown throughout the 1800 and 1900s. By the early 1920s, Harry Riley Spittler had begun using colored light to treat his patients (11). As his work developed, he taught others and formed the Syntonic College in 1933. This work has continued and for over 70 years Syntonic practitioners have been using their knowledge of color and light and the Autonomic Nervous System (ANS) to help a variety of visual disturbances.

Until recently the ideas that the warm colors (red, orange, and yellow) stimulated the Sympathetic divisions of the Autonomic Nervous System (ANS) and the cooler colors (blues and purple) the Parasympathetic were based primarily on clinical observation of treatment and outcomes and on clinical research. Its safety and efficacy has been well established clinically (1,4,11).

The development of computer processing has drastically improved our ability to observe the ANS in action via such techniques as Heart Rate Variability (HRV). Originally developed as an assessment method for cardiologists, HRV has proven to have much wider applications. It gives us, through spectral analysis, a window into the functioning of the Autonomic Nervous system as it is responding to the activities of life. For instance, short HRV measurements have allowed us to take 5 minute segments of responses to a variety of stimuli from medication responses to different colors of light in a therapeutic setting. These observations are beginning to provide us with new information of the functioning of the ANS under many conditions including the impact of different frequencies of light

on both sympathetic and parasympathetic functions (3,7,9,16). There has been very little research work that directly addresses the impact of ocular light or color on the ANS (7,8,9,10). However a Ukrainian researcher, I.A. Paliienko, has found the use of ocular stimulation with red-green and red-violet significantly influenced the spectral analysis of the heart rhythm (8). His work has also utilized different colors with lateral eye stimulation and he reports that the right hemisphere is dominant for Autonomic nervous function and that stimulation of the right hemisphere with red-green light results in a significant decrease in inflammation in Rheumatoid Arthritis (RA) patients but make inflammation worse if delivered to the left hemisphere (8,9)

This paper reports the outcomes of a preliminary pilot study of the impact of red- orange and indigo stimulation on Galvanic Skin Responses, Heart Rate, and changes in the normalized data measured via HRV during light stimulation. It was hypothesized that the light stimulation would result in significant changes in the HRV measurements.

METHODS

Subjects. 23 subjects were measured during demonstrations of the HRV. Homeopathic and herbal remedies and emitted light using a Photron Light Stimulator were utilized during the demonstrations. For the purposes of this study, only persons who received light stimulation were used. None of these subjects were measured with the health care remedies prior to HRV baselines and light stimulation.

The subjects were health care practitioners from Belgium, Germany, France, and the United States. They ranged in age from 23 to 96 years of age with a mean of 49. All subject's education was post-high-school and most had specialty degrees in Health Care ranging from nurses to doctoral level.

Red/orange (RO) and indigo (I) were used to demonstrate changes in HRV. Each person was measured in 5-minute segments during a pre-baseline with no stimulation, two light stimulation segments (RO & I), and a post-baseline. Changes from pre-baselines to color stimulations and to post-baselines were compared in 23 subjects for each condition.

Procedure. Each subject was seated in a comfortable chair. The uses of the HRV and the photostimulator were explained. They were asked about the presence of chronic health problems and medication usage. Those with neurological disorders, seizures, or who were taking medication that was addictive in nature were not tested.

A pre-stimulation base line was obtained on each subject and then the red-orange light flickering at 14 cps was looked at for 5 minutes. Next indigo stimulation at 14cps was given for five minutes with a 5 minutes post-stimulation base line. Galvanic

Skin Resistance was measured each time. The order of presentation was chosen to emulate the assessment process in ocular therapies which give each color stimulation starting with the warmest color ruby or red and moving up the spectrum to the cooler colors ending with purple. Red orange and indigo have been used as anchoring colors in other assessments so this order and the color selection were based on the historical uses of these colors. Unpublished data using the HRV to assess 11 colors suggest that each color has a specific and different impact on the HRV functioning (7).

Instruments. HRV was measured using a PPG to obtain a pulse wave. The data collected was analyzed using BioCom Technologies, HeartScanner software (13). Colored light was delivered via the Photron Light Stimulator by BioTechtronics.

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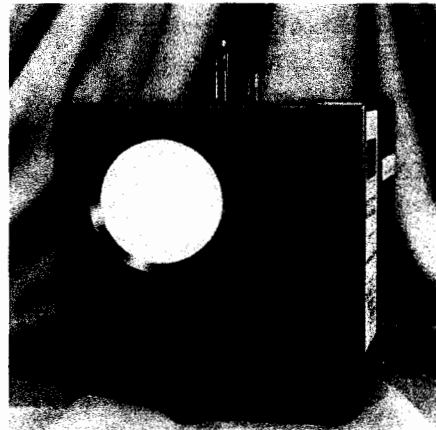
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RESULTS

The data were entered into a statistical database and analyzed by Stat Soft's Statistica Version 5. T-tests for dependent samples, $N=23$ was used.

Data collected included both Time and Frequency Domain Parameters. The Time Domain Parameters gathered were: Heart Rate (HRT); Mean NN; Standard Deviation of the NN or SDNN; and the standard deviation of the root mean square of the NN intervals or RMS-SD with NN the milliseconds (ms) between each heart beat. The Frequency Domain Parameters gathered were: Total Power (TP); Very Low Frequency (VLF); Low Frequency (LF); High Frequency (HF); LF/HF Ratio; Normalized Low Frequency (LF Norm); and Normalized High Frequency (HF Norm). Very Low Frequency represents Sympathetic Nervous System activity; High Frequency represents Parasympathetic Nervous System activity; Low Frequency represents a mix of VLF and HF; and Total Power is the sum of all frequencies.

The following significant results were obtained.

GSR comparisons. The comparison of the GSR measures from pre-baseline to Red Orange were found to be statistically significant with a $t = -2.25$, $df=22,1$ $p>.035$. No other GSR readings were statistically significant.

Heart Rate comparisons. Three of the heart rate comparisons were found to be statistically significant. These were: Pre- to Post-Baseline HR with $T = 2.475$, $df=22, 1$ $p>.0214$; Red Orange to Post-baseline HR with $T = 2.523$, $df=22, 1$ $p>.001$; and Indigo to Post-baseline HR with $T = 2.183$, $df=22,1$ $p>.039$.

Low-Frequency Norms. Three of the LF Norms comparisons were found to be statistically significant. These were: Pre- to Post-baseline with $T = 2.848$, $df=22,1$ $p>.009$; Red Orange to Post-baseline with $T = 2.983$, $df=22, 1$ $p>.0068$; and Indigo to Post-baseline with $T=2.107$, $df=22, 1$ $p>.038$.

LF/HF Ratios. Two of the LF/HF ratios were found to be statistically significant. These were: Pre- to Post-baseline with $T = 2.109$, $df=22, 1$ $p>.046$; and Indigo to Post-baseline with $T = 2.119$, $df=22, 1$ $p>.045$.

DISCUSSION

The results are interesting and suggestive but the number of subjects is too small to derive any solid conclusions about the impact of color on the functioning of the GSR, the Heart Rate, or the HRV functions. Given these limitations these results do suggest that colored light can have an impact on the physiological functioning of the heart and the ANS. These results provide support for the clinical observations of the changes observed during the uses of colored light by practitioners all over the world and encourage continued investigation into the impact of light frequencies on the autonomic functioning of the nervous system.

The GSR changes with red-orange were elevations and show that this warming color activated the GSR, which is what might be expected for a ANS stimulating color. In looking at the HR changes there was little change from base-line to red-orange but the addition of indigo both lowered and expanded the range of HR functioning. The change from indigo to baseline was also significant with the mean heart rate lowered and with more variance in the HR itself.

The changes in the Low Frequency Norms are interesting because Low Frequency is related to both Sympathetic and Parasympathetic functioning and indeed in the clinical uses of HRV the balance point, which is trained, is in the Low Frequency range. The ability to achieve this balance point with breath training and relaxation has been associated with improvements in behavior, affect, and physiological functioning. While there is a significant difference between both pre-baselines and Red Orange to post-baseline measure it appears that the contribution of Indigo was instrumental in the overall movement toward balance in this group of 23 subjects. This observation is further supported by the shifts that occurred in the LF/HF ratios.

Continuing research with HRV and the impact of colored light frequencies on the ANS is needed. The results supported here suggest that initially we need to randomly assign colors to each condition so that the contribution of each color to the functioning of the ANS can be independently analyzed before looking at the cumulative impact of colors. The number of subjects needs to be increased as we are

looking at many variables that function in a wide range of normal across people.

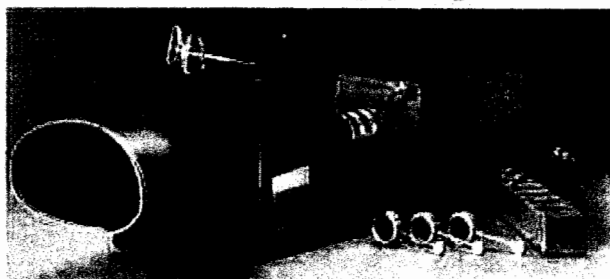
The advent of new color and light research that emphasizes the scientific evaluation of both ocular and on the body applications of light frequencies is

encouraging. It is likely that continuing research will be increasingly recognized leading to acceptance of light and its applications in the mainstream of practice in each of our disciplines.

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FUNCTIONAL VISUAL FIELDS FOLLOWING BRAIN INJURY

By Ray Gottlieb, O.D., Ph.D., FCSO, Dean

This article is a review of some of Kurt Goldstein's writing, particularly the parts related to visual fields and other visual disturbances following brain injury. Goldstein was a neuropsychiatrist who worked extensively with brain-injured WWI soldiers. He and his colleagues produced important research concerning the diagnosis, rehabilitation, and coping patterns of these soldiers. Goldstein was one of the most respected neurologists of his time and is considered one of the pioneers of Gestalt psychology. The following represents just a small part of his writings. Much of this material comes from two of Goldstein's books, The Organism: A Holistic Approach to Biology Derived from Pathological in Man (1939, American Book Company) and Aftereffects of Brain Injuries in War: Their Evaluation and Treatment (1942, Grune & Stratton, NYC) My own thinking and approach to vision therapy has been significantly shaped by reading and re-reading his books over the last 25 years. Each time I study his ideas, my own understanding of vision therapy grows.

This article is intended to share Goldstein's work as it relates to modern syntonics phototherapy procedures, particularly visual fields following injury. The first half of the 20th century was a golden age of functional visual field study. This period lasted until automated computerized threshold field devices became the standard of practice and narrowed the view of how field testing is done in offices and clinics. This new testing became popular because doctor and staff presence were not required for most of the testing. Test results were automatically recorded and stored. Threshold fields were considered more reliable and objective than older testing methods. The problem is that structural field loss (directly due to destruction of tissue) as measured by the automatic threshold devices became the only valid and scientifically acceptable data and functional field loss lost its credibility.

Goldstein's insights support the syntonics practitioners' use of functional visual field testing. Functional field testing gives us a unique and powerful way to measure the loss of visual capacity and the progress of its recovery following brain injury or other visual disease. Functional fields help us diagnose our patients before treatment, verify the accuracy of our prescription during, and evaluate the degree of short and long-term success after treatment. Syntonics practitioners administer the field test themselves and directly observe not just the size of the field (when patients first see a target appear or disappear), but also the quality of their visual responses (can they see the black circle around the target, does the target become dim, does it look double, can they see its shape, when colored targets get bright, and the presence and the effects of fatigue. In Aftereffects of Brain Injuries in War, Goldstein describes how various qualities of vision improve in a specific sequence and the functional improvement proceeds from the central to peripheral field.

BRAIN INJURIES AFFECTING VISION

When we consider the extensiveness of the visual pathways and the position of the visual center in the occipital lobe, directly beneath the bone, the frequency of visual disturbances in brain injuries is understandable. Goldstein found that visual field defects are frequently found following diffuse blows to the head that do not directly injure visual areas of the brain. In many of these cases the field impairment disappears later. Visual disturbances may also exist due to frontal lobe lesions or as expressions of abnormal fatigue. Therefore a thorough investigation of vision in all its aspects should be part of each examination of a brain-injured soldier.

In addition to the usual ophthalmologic examination, Goldstein felt it necessary to test the visual field with particular care, with both ordinary and strong illumination, and with a perimeter and a tangent screen. With strong illumination, some perception can often be demonstrated to exist in parts of the field which are not excitable under ordinary illumination. (Goldstein also performed an extensive tachistoscopic examination. His testing procedure, slide sequence, and diagnostic interpretation are described in Aftereffects of Brain Injuries in War: Their Evaluation and Treatment, pp. 99-105.)

If the injury to the occipital lobe is extensive, total blindness frequently follows shortly after injury. Fortunately, even in very extensive damage of both lobes, Goldstein found that total blindness was very rarely permanent. Goldstein found in most of these cases that very strong stimulation can evoke a reaction in parts of the field* that appear to be totally blind under average stimulation

Besides visual field defects, defects of visual acuity, of color, of space, and of visual recognition (visual agnosia) were common in these patients. Voluntary eye movements were usually normal in spite of apparent total blindness. Only in cases with disturbed visual imagination (visual agnosia) were voluntary eye movements impaired. In some cases of occipital lesion, oculomotor nystagmus could not be elicited in the direction toward the side opposite the lesion. The pupillary reflex to light was usually intact, but often with decreased responsiveness. This was true even in cases when lesions were confined to the cortex.

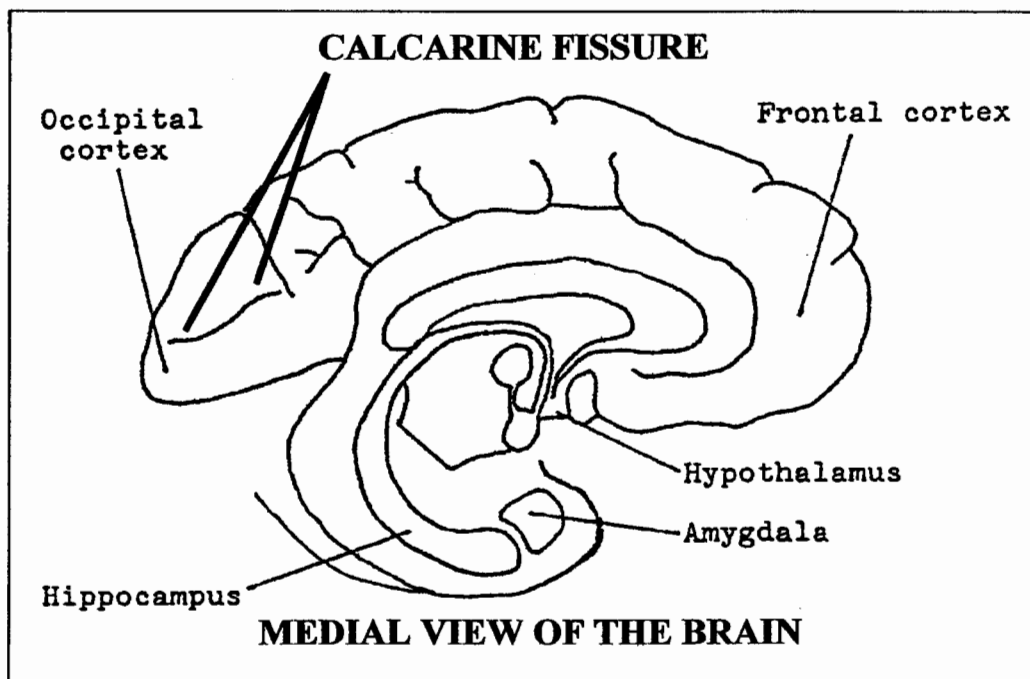
QUALITATIVE RECOVERY OF VISION AFTER INCIPIENT BLINDNESS

Goldstein found that even when total blindness occurs after injury to the occipital cortex, vision usually returns in time. He observed that sight did not return all at once but emerged as distinct qualities of vision that appeared in a definite sequence and that these improvements

occurred first in central vision and then spread to the periphery. We see this when we measure visual fields in our patients.

We can think of visual fields following brain trauma as a measure of the recovery of sight after an initial, temporary blindness. We use fields to establish the initial level of recovery and to access the progress of rehabilitation due to phototherapy. Syntonic fields measure not only the size of the field but also the recovery of functional visual qualities. Goldstein's sequence gives us a clue to understand our findings. Why central fields are better than peripheral fields (because central returns first); Why field size expands (because central returns first); and why shape, size, color, speed, fatigue, and multiple target perception improve with phototherapy (because certain visual qualities return before others). Here is the sequence of returning visual qualities that Goldstein described following brain trauma:

- The most primitive degree of visual capacity, the perception of light and dark, is the first quality to return. Often described as "diffuse illumination," or "cloudy brightness," this perception of brightness lacks definite size, form, or relation to space. This sometimes occurs first in one eye before the other. Moving stimuli are generally perceived earlier than stationary ones.



The Calcarine Fissure runs through the primary visual cortex and divides the superior and inferior halves. The cortex below the fissure is sensitive to stimulation in the lower visual field and the reverse is true for the area above. (From Gottlieb, 1978.)

- A sense of size comes back in the second stage. Patients begin to distinguish between large and small objects, but are not able to estimate actual sizes. At this stage, judgment of distance is inexact. If objects are localized at all, they appear to be displaced toward the center of the visual field.
- In a further stage of recovery, it becomes possible to distinguish discrete objects. At first the patients sees only one object when two were presented. The two objects blur and fuse into each other. Later, seeing the two objects as separate entities is possible.
- Perception of simple shapes preceded before perception of complicated ones with definite contours. Objects such as letters presented to the patient are often not recognized initially.
- Color vision may be totally lacking for a long time with everything appearing gray. In the course of color vision recovery, red is often seen first and blue last. All colors at first appear darker than normal, like perception under decreased illumination in normal persons. There are cases with a long duration of blindness for red and green, without any disturbance as regards yellow, blue, white, and black, or any shrinkage of the visual field. In these cases the lesions are usually located for the most part in the left hemisphere, in the lateral region of the occipital lobe, outside of the calcarine area.

The gradual recovery with these qualitative changes might occur over the entire visual field for some patients or merely in parts of it for others.

ENERGY AND PERFORMANCE

Even when a full recovery of vision takes place, an abnormal fatigability of vision may persist. Goldstein felt that brain injured patients were more vulnerable to fatigue. Disturbed parts of the injured brain required excessive amounts of energy, he said, and that since there was only so much nerve energy to go around, some competing brain areas would be under-supplied, thus critical performances would tire easily. His example of this competition for energy in normal people was the antagonistic energy distribution between sensory and thought performances that causes sensory vividness to dim during thinking. He pointed to a similar antagonism between motor and sensory phenomena, between verbal and non-verbal performances, and in similar cases where performance is weakened because the available energy is being used to maintain activity in that mechanism upon which the other performance depends.

This becomes particularly evident in pathological conditions when a brain lesion impedes visual functioning. Expressed in terms of energy, this means that special energies become necessary to maintain the function served by a damaged area of the brain. Patients fail in what they can otherwise accomplish, when performances involving an injured area are simultaneously required of them. If an aphasic patient is asked to read aloud, he may not be able to understand what he reads because much of his energy is used in coping with his speech impediment. But if he reads silently, he may be able to read with full understanding. This aspect of differential energy distribution must be taken into full consideration in every symptom analysis.

Of course, the whole organism is one unit, in which the nervous system, if considered by itself, is only an artificially isolated part. Inasmuch as the nervous system is an integral part of the organism, its sources of energy must be the same as for the whole organism. In carrying on this function, individual organs (e.g. the ductless glands) have a specific significance. In order to appreciate the range of the nervous system's functions, we must take into account its special relation to the general sources of energy, such as the nutritional factor, the oxygen content of the blood, sleep cycles, etc. Only in this way can we hope to understand the characteristics in a given case.

ANNULAR SCOTOMA DUE TO FATIGUE

When vulnerable to fatigue, repeated stimulation of the same part of the retina can reduce its sensitivity to such a degree that the same stimulus may no longer be detected. This phenomenon is the cause of annular scotomata.

Goldstein described how even when acuity, visual field, fundi, refraction, etc., show normal results, the patient may nevertheless suffer visual disturbances. In these cases a neurotic condition is often assumed to be the cause. However, this may be incorrect. There may exist an abnormal fatigability of vision. This condition may not be revealed by the normal procedure of examination. But when the patient is tested by the following procedure, rings of dim or blind vision occur in the visual field. This defect is frequently found in cases of brain injury, especially after *slight* damage to the occipital lobes.

With perimetry, where the outer border of the field is determined by proceeding from the center outward, one may not find anything unusual other than a certain shrinkage of the field. But if one moves the object from the periphery along the same meridian back toward the center, the patient may first see the object at a certain place, then not see it as it slowly moves in, then see it again, and so on. If one marks these points and also

measures along other meridians in this way, one finds the same in and out phenomenon. If those parts that showed vision and those with no vision are connected between the meridians, one gets concentric rings of seeing and no seeing.

*

Goldstein noted that *there is never a ring defect in the center* and that the rings will move their position as conditions of fatigue, illumination, target speed, or intervals between stimuli change. These annular scotomata are not due to damage to the retina or the ocular cortex in annular form but result from two factors:

- the normal decrease in excitability from the peripheral to the central parts of the retina;
- the fact that there is a defect, organically caused, of abnormal fatigability causing an inability to sustain the visual sensitivity or threshold of excitability.

The annular scotomata demonstrate the great variability sensory threshold characteristic after cortical damage. Because this abnormal fatigability may be disturbing to the patient, the demonstration of annular scotomata gives important information of a patient's working capacity and also for the substantiation of complaints.

CONSTRICION OF THE VISUAL FIELDS

In lesions of both occipital lobes where the whole peripheral field appears unresponsive, a small island of central vision, a 'macula sparing', can be measured as a maximally constricted field ranging from 1° - 10° in diameter. Macula sparing is most often greatest in the vertical meridian, of equal size and form on both eyes (although differences may exist), with more restriction in the temporal field than the nasal, and equal in size for both white and color fields.

Goldstein considered this macula sparing as the beginning stage of recovery from a general field loss with the central vision recovering before the periphery. Since the threshold for stimulation is normally higher in the periphery than in the more centrally located regions, the center may still be activated while the periphery is not. The result is the restricted field. This is not a fixed field. Transitional states in which the edge of the visual field may pass through the fixation point at one time and at other times as a concentric area of increasing central vision are measured over time. In tests with less illumination, the central parts of the field may show decreased response. In cases of complete hemianopsia, Goldstein often found that the sound field also is constricted to some degree.

Although this type of field constriction occurs in organic diseases such as chronic alcoholism, high intracranial pressure, and in hydrocephalus, these field constrictions are usually judged to be functional rather than organic. But Goldstein insisted that these fields were frequently found in his brain injured patients as a direct consequence of the brain damage, as a diminution of visual attention resulting from diffuse damage of the function of the cortex, and not a neurotic complication.

Goldstein also described a difference between two forms of constriction. In one case the field appears to be of equal extension around the center, and in the other the collapsed field preserves a shape similar to that of a normal visual field, i.e. has the typical unequal extension in the nasal, temporal, superior and inferior quadrants. The first form, concentric constriction, is more often an expression of a neurotic condition. Usually in these cases a tubular constriction (field diameter does not increase with test distance) and other hysteric disturbances are also observed. However, a tubular constriction of a certain degree can also occur in organic defects and under certain conditions resembles that found in hysteric conditions.

Goldstein found a way to distinguish between the tubular fields of neurotic and organic patients. In organic disease the increasing constriction, on examination at various distances, is not as great as in hysteria. Also, tubular constriction in organic cases is only observed when tested with the campimeter, not in investigations at various distances with the perimeter. In hysteria the tubular constriction appears under both conditions. It is important, therefore, to remember that tubular constriction in campimetric investigation is not necessarily a sign of hysteria. In each case the diagnosis of hysteria must be confirmed by other hysteric findings, especially the hysteric mental condition.

The second form of constriction (unequal extension in various quadrants resembling normal) is, according to Goldstein, an expression of impairment of vision, but without severe specific damage, due to or increased by an impairment of attention. Normally, attention is directed more toward the center than the periphery of the visual field. In brain injury, attention may be diminished in general after diffuse cortical injuries, injuries of the frontal lobe, or in visual functions in particular with injuries of the occipital pole. This diminished attention may find expression in a constriction of the temporal part of each field, or in cases of hemianopsia, as a constriction in the temporal part of the uninjured field. If the temporal parts are constricted, the field defect may appear similar to that in pituitary disease but differs from the latter in

that it never becomes a bi-temporal hemianopsia as the nasal part of the field is always constricted too.

Visual field defects look quite different upon being tested with stimuli of different size or intensity, or with moving vs. stationary objects. Visual fields are complex; one must proceed with sensitivity and attention. For example, if the amblyopia is very strong, the function of the periphery can be so diminished that stimulation with a large target falling across an extensive area of retina will not be detected, while a small target that falls within the macula area will be seen.

The form of the field defect differs somewhat when the visual pathway rather than the visual cortex has been damaged. In the cortical cases, the defect is usually more severe and more permanent. When damage is limited to the visual pathway, some recovery usually takes place. The functional defect depends also upon the degree of damage in the surrounding parts of the calcarine area, upon the condition of the whole brain, and the psychosomatic condition of the individual as a whole.

MONOCULAR DIPLOPIA.

Some patients suffer a reduction of visual efficiency in certain areas of the retina such that clear vision can take place only by duplicating the object seen. Goldstein found that when the visual function is impaired, effective vision, when it can be elicited, is accompanied by a pronounced monocular diplopia. As the functioning of the visual apparatus becomes stronger, the monocular diplopia goes away.

Numerous experimental investigations have suggested the following explanation. If it is essential that a good visual response be made to a stimulus affecting one area in the retina, and if damage to the substrata has made this impossible, there will occur an abnormal spreading of the excitation into an adjacent area with a better performance capacity. For instance, the excitation spreads into a field closer to the macula, which normally functions more efficiently than the peripheral zones.

By this process, the object is seen better, but it appears displaced towards the macula. At the same time, a second image appears, which is correctly localized, i.e., its localization corresponds to the position of the object; and inasmuch as it depends upon the original excitation, does not completely disappear. This second image is weaker than the displaced, false image, relative to the reduction in functioning of the damaged area that was directly stimulated. Since the spread of the excitation, which makes satisfactory visual performance possible, necessarily involves the appearance of a double image,

the organism apparently reconciles itself to the fact of being less disturbed by diplopia than by deficient vision. Indeed, the patients may only be aware of poor vision. The diplopia may not be discovered until the visual field is tested.

THE PSEUDO-FOVEA

The visual complaints of patients with field loss may not correspond in everyday life to what we would expect in view of the perimetric findings. If the scotomata measured in a field test are not greatly extended, the patient may not be aware of them at all. A hemianopic defect may be realized only in perimetric investigation. Even a with complete hemianopsia that consistently appears under examination with a perimeter, the patient may appear to recognize objects within the area of the visual field corresponding to the blind half of the retina. They may be aware of a somewhat impaired vision, but it is by no means true that they see only one half of the object, or even that they see one side less distinctly. That this part of the retina has not become sensitive to stimulation can be demonstrated by use of the perimeter. Therefore, we can only conclude that these stimuli have been registered with the intact half of the retina.

“Possessing a visual field arranged around a center is of extraordinary importance for visual efficiency. An object is clearly understood only when perceived in the context of the visual field surrounding it. And so despite their profound visual defect, hemianopic patients seem to be able to shift their visual organization to regain a functioning field that surrounds a region of clearest vision near the center of the field. Careful investigation actually shows this to be the case. If the patient is presented with a series of figures next to each other on a blackboard and is asked which is most distinctly seen, the patient does not indicate the figure aligned with the macula as would a person with no visual impairment. Instead the patient indicates one that lies further to the side within the intact retina. This could happen only if the eyes shifted their aiming position to a point peripheral to the macula. It is to this functional center that attention is directed when attempting to see objects clearly. Such a displacement can actually be observed.” (See: Wilhelm Fuchs, “Phenomenal Displacement in Visual Forms,” pp.333-343, in *A Source Book of Gestalt Psychology*, W. D. Ellis, ed. Routledge & Kegan Paul, LTD, London, 1938.)

“For these patients, a new region of best vision, a ‘pseudo-fovea’, develops peripheral to the fovea and with this shift, *the function of every point on the retina likewise transforms*. The macula now functions as peripheral zones normally do, modified not only in visual acuity with respect to black and white, but also to colors

and spatial values. Accurate investigation of visual acuity in such cases has shown that it decreases from the new center towards both sides - the decrease including the anatomical macula. It has been shown that, in visual acuity, the new point of clearest vision, the pseudo-fovea, may surpass the anatomical fovea by 1/6, 1/4 or even 1/2." (See: Wilhelm Fuchs, "Pseudo-Fovea," pp. 357-361 in A Source Book of Gestalt Psychology, W. D. Ellis, ed. Routledge & Kegan Paul, LTD, London, 1938.)

Ordinarily, the patient sees objects, that are projected on the pseudo-fovea, as lying straight ahead, just as normal people see "straight ahead" the objects projected upon the anatomical fovea. In a corresponding degree, all other spatial values, determined by their position relative to the new center have also changed. In short, the functional value of every point of the retina has undergone a change, as do corresponding points of the visual cortex.

The change, however, does not produce a new formation which is permanently fixed. The position of the center of acuity, the pseudo-fovea, varies (and with it, the properties of each part of the retina) according to the particular visual object that confronts the patient. This coming-to-terms with visual stimuli by the hemianopic is not fundamentally different from that of people with uninjured visual lobes. The principal differences are that the patient's field is restricted and their acuity is not as good as that of the normally sighted.

This change in function of individual points in the calcarine region, which at first seems so striking in the hemianopic, fits completely within the frame of normal occurrences. Even in normal people, there is no constant relationship between a particular part of the retina and a particular function. The contribution of any part of the retina to the total performance in fact changes according to the task with which the organism is confronted, and according to the kind of adjustment the situation requires. This holds, for example, for visual acuity in any one part of the retina. The acuity in each point varies with the functional significance of the contribution which that point makes toward an adequate perception of the object.

These functional arrangements depend on the pattern of excitation of the entire retina and on the general attitude of the organism toward objects in any part of the field. Even in people with normal vision, if an object that is registered on the periphery assumes great importance, this peripheral point becomes the center of the visual field and gains certain properties, such as: "straight ahead," "directly regarded," "distinctness," that under other conditions would be ascribed to objects focused upon the fovea. Visual acuity of any point of the retina is

determined by its participation in the configurational process, corresponding to a definite object. Analogous conditions prevail for other performances of the retina.

Observation of patients with operated strabismus show, among other things, that spatial values do not depend absolutely upon the excitation of definite retinal points. Investigation also shows that the shift of spatial values after the operation does not occur as a result of training. The shift happens spontaneously and suddenly according to the basic needs of the organism.

This last fact also appears very clearly in instances of lesion of the calcarine area. It is impossible to determine with certainty at what moment the above modification occurs in these cases. We have no definite information as to how, in the initial state of disturbance, the patient really sees things. But from all indications, the modification is to be found at the time the patient is again using his visual apparatus effectively. In any event, it is not the result of training, as the fact of its occurrence without the knowledge of the patient proves. In ordinary life, whenever the patient "looks at an object," the eyes assume the mentioned displacement, without the patient being at all aware of the fact. (The forgoing is from the Organism, Author, publish date, etc., p. 52.)

The visual experience of hemianopic patients is aided in another way. In tachistoscopic presentation, these patients may report seeing certain objects as wholes when one part falls into the blind side and the other part onto the sound side. Only in those cases where an object can be completed in accordance with definite gestalt laws, when the unseen part belongs essentially to the figure as a whole, is the whole figure seen. For instance, a circle flashed concentric to the fovea is completed and seen as a whole circle. However, if the figure of a dog is flashed in a similar manner, only half the dog figure is seen. (See: Wilhelm Fuchs, "Completion Phenomena in Hemianopic Vision," pp. 344-356, in A Source Book of Gestalt Psychology, W. D. Ellis, ed. Routledge & Kegan Paul, LTD, London, 1938.)

HEMIAMBLYOPIA

The above described shift to a pseudo-fovea occurs only if the calcarine cortex is completely destroyed. In hemiambyopia, where the damaged calcarina is still capable of a normally formed visual field around the anatomic fovea, even if the field is constricted, the transformation does not occur. That half of an object may appear dimmer, apparently does not disturb perception enough to trigger the hemianopic displacement. The transformation will not occur because such transformation in itself entails disturbances of the total

behavior. The organism bears the shift if good vision is otherwise impossible, but not if adequate vision can still be maintained in some measure without eye shifting, as in hemiambyopia.

A slight impairment of the function of one calcarine can influence the function of both the sound and the impaired side under certain conditions. In minor calcarine damage, the usual perimetric tests may not reveal any field defect. When an object is presented to the hemiambyopic region for a short period of time, the patient may be able to recognize it. The patient's vision in this same region may, however, be impaired due to a lack of attention if the sound half field is presented with a second target at the same moment. The object in the impaired half is no longer seen.

The effects of attentional demand on visual fields of brain-injured patients has been studied using the Halstead Dynamic Visual Field apparatus which uses a graduated target flashed at various points in the peripheral field while a colored shape is simultaneously exposed at the fovea. The patient triggers the exposures and then records what was seen at the fovea and in the periphery at various exposure times to map the limits of the peripheral field while making a form and color discrimination at the fovea for each exposure time. Halstead called this the "Dynamic Visual Field." For the normal individual, exposure times of 20-30 milliseconds yield a full field. Patients with hemianopias needed exposure rates of 60 milliseconds to see a full half field (on their seeing side). Ward C. Halstead, "Brain Injuries and the Higher Levels of Consciousness," p 495, Trauma of the Central Nervous System, J. Browder, editor, Research Publication of the Association of Nervous and Mental Disease, Vol XXIV, The Williams and Wilkins Co, Baltimore, 1945.

More recently, Seiple, et. al., measured visual field loss in normal subjects required to do more than one task concurrently. Subjects either did or did not do simultaneous math problems during field testing. Results on two different types of visual field devices were compared. Every subject had locations of significantly reduced Humphrey visual field sensitivities while doing the Paced Auditory Serial Addition Task. But no subjects had field loss when visual fields were taken using visual evoked potential amplitudes while doing the math. See: Seiple, et. al., "The Multifocal Visual Evoked Potential: An Objective Measure of Visual Fields" Vision Research, 45 (2005) pp/ 1155-1163.)

This dependence of performance on the available energy may manifest itself in a phenomenon which is at first rather surprising. Patients who suffer total destruction of

a brain area essential to a certain performance may be less afflicted than those who suffer only partial destruction. This is true in minor calcarine lesion, where the afflicted area remains in use. A patient with a less intensive injury of one calcarine area is, to a certain extent, actually more disturbed in his vision than a patient with a total destruction of this area.

In terms of energy this is easily explainable. As long as a moderately effective performance can be achieved, the organism tends to function in the accustomed manner, attempting to distribute energy to both calcarinae as before. Because more energy than usual is required for the damaged area to perform, energy is sapped from the healthy areas, depleting their performance, and poor vision results. If, on the other hand, one of the calcarine areas is completely destroyed, the flow into the destroyed region is, so to speak, blocked, and the total amount of energy at the disposal of both calcarinae now flows into the intact one. The high energy charge of the intact side affects a shift of the entire brain activity, so that a more efficient result is actually obtained, at least as far as vision is concerned.

DISTURBANCES OF COLOR VISION

In damage of the calcarine region, color vision usually suffers earlier and more severely than perception of white and black. Under average illumination, the visual field for black and white may appear normal, while for colors it may show a defect. In those cases of concentric constriction due to organic origin, the shrinkage of the field for color and for white and black usually is of equal extent.

Cases of injury of the occipital lobe have been reported, in which color perception was diminished, especially the perception of green and red, without any modification at all of the visual field or of perception of white and black. Careful examination has revealed that in these cases the lesion is located in a region outside of the calcarine. Usually the lesion affects the left hemisphere.

It is important to distinguish between "surface colors" and "film colors." Surface color is color that appears at the same place as the object to which it belongs. Film color is not so definitely localized. It fills the space and is not closely part of the objects. All color vision in Goldstein's patients assumed the character of film colors. Colors seemed to occupy or fill the space. The various colors appeared to be of different thickness. Therefore the contours of objects stained with different colors appeared distorted in various ways. This symptom probably belongs to the group of symptoms characteristic of visual agnosias.

OTHER VISUAL DISTURBANCES

Disturbances of localization

The visual shift -- In lesions of the occipital lobe, displacement of seen objects may occur either as a disturbance in the perception of the position of a point relative to the retinal fixation point or as a point shifted relative to the external space surrounding the beholder. Objects are usually displaced away from the impaired field towards an area that has better vision, as if an area of better vision had been stimulated.

Past-pointing -- Visual space in its entirety can also be shifted in patients with hemianopsia or hemiambyopia who past-point in the direction of the visual shift. Deviation in the pointing test gives early evidence of damage in the central visual cortex.

Dividing a line -- In this test the subject has to divide a horizontal line into two equal parts while fixating the end of the line. Normal individuals tend to make the peripheral side portion a little too long due to a normal shortening of perception in peripheral vision. Because they must use an even more peripheral part of the retina for this judgment, hemianopic patients make similar but much larger errors than normal subjects.

Object counting -- The patient is given the task of counting a number of sticks or objects. In this he makes great mistakes, which are probably caused by disturbances of visual localization and higher visual processes, belonging to the category of agnosia (loss of the ability to identify or copy shapes or derive meaning from sight). Failure in this test may occur without a visual field defect. This type of disturbance is often the cause of difficulties in reading as well as in writing.

Object searching -- The subject has to search for one of many objects drawn on a blackboard. The patient with a disturbance in visual space orientation shows a marked lack of skill in finding the object. His gaze wanders around vaguely. He may pass by the required object. This defect is not related to an impairment of vision in a particular part of the visual field.

All the disturbances of visual localization mentioned here are related to damage within the calcarine region. There are other disturbances of localization (disturbances of localization in depth, disturbances of perspective vision, etc.) whose origins are vague, but that probably belong to visual agnosia with lesions usually located in the occipital lobe outside the calcarine convolution.

DISTURBANCES OF TONUS AND EQUILIBRIUM DUE TO LESIONS OF THE FRONTAL LOBES

In lesions of the frontal lobes, even years after injury, a symptom complex frequently found consists of the following phenomena. (From Goldstein: Aftereffects of Brain Injury in War, p 52)

Abnormal postures occur (especially when the patient shuts his eyes), such as tilting of the whole body or parts of the body (head, trunk, outstretched arms) toward the heterolateral side. This may also affect both arms; the heterolateral arm is usually more markedly affected. The outstretched arms move in this direction and sometimes upward. There is past-pointing toward the heterolateral side with both arms, particularly the heterolateral, sometimes also the legs. When standing with eyes closed the patient may fall to the heterolateral side. In attempting to walk straight ahead, he may deviate to this side.

Abnormal hypersensitivity to stimuli on the heterolateral side. All reactions of the heterolateral side to stimulation are increased as compared with the homolateral side. The patient startles easily when stimulated. Touching the skin of the heterolateral side, or stimulating the heterolateral eye by light, increases falling, past-pointing, etc. There is a hypersensitivity of the heterolateral labyrinth.

Sensory errors on the heterolateral side may occur. The patient may make errors, for instance, in the localization of touch stimuli, in the direction of the heterolateral side. Small weights may be overestimated, and discrimination of various weights may be less accurate with the hand of the heterolateral side. A line that is in an objectively vertical position may be perceived as tilted toward the heterolateral side.

Impaired voluntary movement of the eye and head toward the heterolateral side can occur in some cases. Others may show a diminution of the optokinetic nystagmus in the direction of the heterolateral side.

ABSTRACT AND CONCRETE ATTITUDE: THE CATASTROPHIC REACTION

All patients with brain injury have a tendency to simplify the demands in their life. Many of these patients lack the flexibility of mind to cope with tasks that require choosing between alternative actions or transitioning rapidly from one skill to another (abstract attitude). They strive for clarity, predictability, and order, and are capable only when confronted with something concrete, something tangible, something that they can handle. (concrete attitude). Only by this arrangement are they able to fulfill, with the least expenditure of energy, their

essential needs. Otherwise they may become helpless, ineffective, disturbed and driven to catastrophic reaction. Immediately upon deprivation of concrete points of reference, such patients fail completely or desperately seek ways to cleave to the tangible. These points of reference may easily escape the notice of a perfunctory observer,* but they are extremely characteristic of the behavior of such patients. To avoid this anxiety, these patients cling tenaciously to an order that is adequate for them but which appears abnormally primitive, rigid and compulsive to normal people. This attempt to hide the impoverishment of their mental abilities is the primary symptom of the defect and it is the one most likely to escape attention.

The abstract attitude is required for the following:

- Assuming a mental set voluntarily.
- Shifting voluntarily from one aspect of a situation to another, making a choice.
- Keeping in mind simultaneously various aspects of a situation.
- Grasping the essential of a given whole, breaking up a given whole into parts and isolating them voluntarily.
- Abstracting common properties, planning ahead ideationally, assuming an attitude toward the "merely possible," and thinking or performing symbolically.
- Detaching the ego from the outer world.

(Goldstein, After effects of Brain Injuries in War, p 90)

Goldstein observed more than 200 brain injured patients daily for a dozen years and became aware of how easily and how often the loss of abstract ability escapes clinical awareness. Patients develop alternative skills that mask their loss and avoid situations that expose their lack of abstract processing. Without knowing a patient's abstract and concrete capacities, test results will be less consistent, rehabilitation therapy less effective, and performance on various tasks less predictable.

Goldstein and his colleagues developed testing materials (many visual) to determine the characteristics and limits of these behaviors. Some of the tests used by vision therapy optometrists are based on Goldstein's tests. For the most complete description see: Kurt Goldstein, and Martin Scheerer, Abstract and Concrete Behavior: An experimental Study with Special Tests, Psychological Monographs, Vol. 53, No. 2, American Psychological Association, Evanston, IL, 1941.

It is also important to keep in mind that all defects in performances depend upon the locality of the lesion and upon the extent of the damage, the kind of change in the

brain matter, the general condition of the entire brain, even the physical condition of the entire body, and finally upon the psychophysical constitution of the individual.

CONCLUSION

It is unfortunate that functional visual field testing is not better recognized. Tunnel vision in school children is rarely measured, yet studies find that between 9% and 20% of unselected children have significant field constrictions that impact their learning. (See: Eames, T., Restrictions of the Visual Fields as Handicaps to Learning, Journal of Education, Vol 2, 1936 and Searfoss, J & Garzia, R., Tunnel Vision, a Loss of Visual Sensitivity in School Age Children, Journal of Optometric Vision Development, 21 (3):117-130, 2000) The tragedy is that thousands of children with collapsed fields go undetected every year. Everyone loses, especially these children and their families who must bare needless emotional pain and lost opportunity for a better life. It is my hope that Goldstein's observations will bring syntonetic practitioners new insight and perhaps will inspire us to devise even more meaningful ways to actively explore and expand functional visual field testing in clinical practice.

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Conversations with Charlie

By Sarah Cobb

Sarah: *There are studies that suggest intensity of the light source is a critical factor in effective instrumentation. Do you agree?*

Charlie: This question can be confusing. Many people mix frequency and intensity up. So to answer...Intensity is a stimulus. A minimum stimulus gets a normal response; a slightly stronger stimulus may increase response; a still stronger stimulus retards the response; and a too strong stimulus stops the response.

Sarah: *In mapping the field is it better to move the probe in quickly or slowly? Why?*

Charlie: After plotting the form field as well as the color fields with a rather slow motion, you move the wand very slowly through the periphery. Why? The reason is it is easy to pick up scotoma's if they are there. Many problems around the fovea should be done with a 1/2 degree wand and the other with a 1 1/2 degree wand. This is the standard we have set in running fields.

Sarah: *What does it tell you when a white form field is normal size but all the color fields are collapsed?*

Charlie: This a very good question because it happens. This tells me that there is a toxic condition that needs to be checked out before any therapy is started. Most of these toxic conditions are above the shoulder, for example, the sinus, teeth, tonsils, etc. Have the children open their mouth and check their teeth. Ask about the amount of soft drinks they drink. Suggest a good physical with blood chemistry any therapy done when you have these conditions will not hold.

After the toxicity has been corrected and they still have a visual problem then the therapy will hold and correct the problem.

What does swelling around both blind spots tell you? It means there is stress such as trauma, accommodative stress, emotional stress, and/ or physiological stress. All these can cause this.

Sarah: *How does mu/delta with alpha/omega differ from using mu alone then neurasthenia alone?*

Charlie: We prefer to use alpha/omega first then mu/delta. Alpha/omega is an emotional stabilizer and mu/delta is a physiological stabilizer. This works well in 70 to 80 percent of the cases. Mu alone is also a physiological stabilizer but it is better to modify mu with delta which is a sensory stimulator. Neurasthenia is a motor relaxer so there is a definite difference.

Sarah: *Generally what conditions are boosted by the D and under what circumstances would you use the S in your filter combinations?*

Charlie: Upsilon/omega D is the strongest sensory and motor relaxer we have. It is used sparingly. I used it in trauma (only) cases when you want to reduce the fluid being produced by the body. Especially in the brain where is affecting the visual system and stopped as soon as it was doing the job I wanted. Usually for the first 5 days I use 5 to 8 minutes of upsilon omega D followed by mu upsilon for 12-15 minutes. If it improves, I go to 20 minutes of mu upsilon.

What about the S?

S can be added to any sympathetic side as an add on if the filter combination is not working to your satisfaction. S makes the filter combination stronger.

"A minimum stimulus gets a normal response; a slightly stronger stimulus may increase response; a still stronger stimulus retards the response; and a too strong stimulus stops the response"

Sarah: Often chronic conditions become acute and sometimes a person with a chronic condition has an acute emotional reaction he is dealing with. How do you weigh these factors when considering which frequency to use?

Charlie: Wow! This is an ulcer case. You deal with the major problem first. You are dealing with an emotional and physiological problem. Don't try to do everything at one time. Stay in the middle with the frequency. Let the patient respond to the therapy. It sometimes is a slow process. Try to correct the physiological problem first and usually the emotional will correct itself.

Sarah: How is the best way for an optometrist to get started in syntonics?

Charlie: The best way to learn syntonics is to practice. You learn by doing. Then if you really want to know what is going on you have to study. Much of the material you are given today does not give you advanced information. But we do have this information and it is available through the College. I can't tell you how important it is to maintain your equipment.

**Pierre Van Obberghen
Teaches in Northern California
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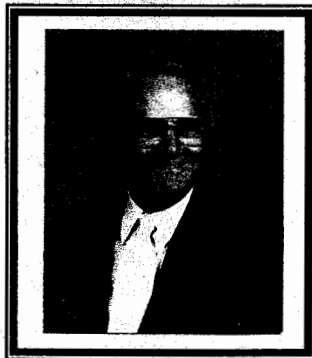
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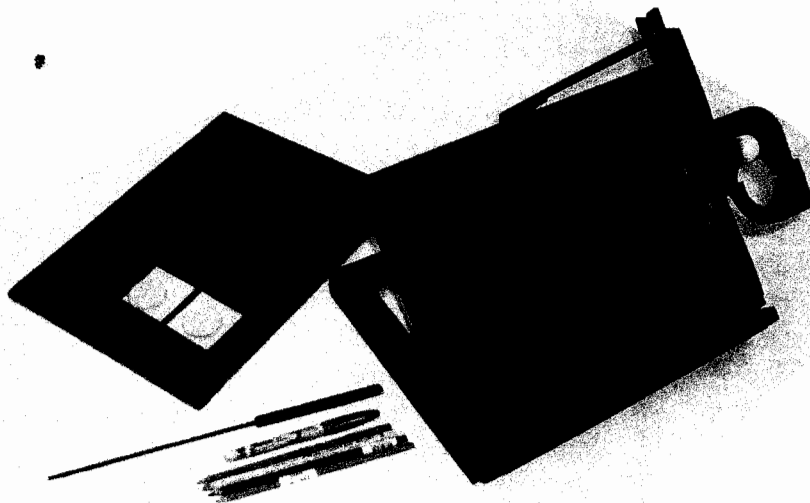
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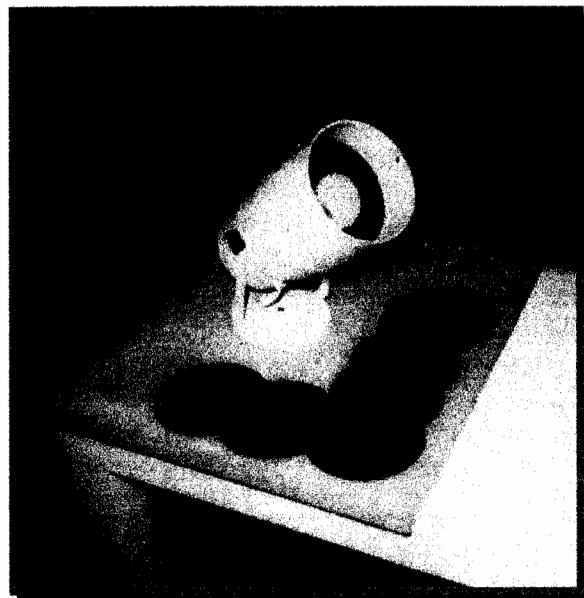
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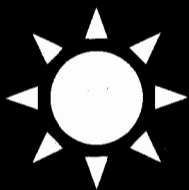
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