

# Mind-matter-environment

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## Introduction

The central aim of most of my research projects is describing the interface and interaction between consciousness and matter, also in relation to our environment. While doing my research, I am aware of the fact that the scientific paradigm is part of the modern Western worldview, which perceives the world from a disenchanted stance, as consisting of autonomous things, while other cultures' worldviews are entirely different. For example, the Andean worldview sees everything as relation and animated, as Note mentions in her paper. Buddhist and Yogic worldviews from the East consider all of material reality as stemming from our consciousness. The modern Western, scientifically inspired worldview is also different from ancient (including pre-Christian) worldviews in the West, which have been (partly) forgotten. Nevertheless, I have tried to study themes (like the relationship between consciousness and matter), which are regarded as quite unusual subjects in Western materialistic, objectivistic, reductionistic science.

In this way I also explore the boundaries of the Western scientific paradigm. As scientists we also experience, think and act within the limitations (and possibilities) of our Western first- and second-order ordering principles (see Note's paper). This has resulted in implicit statements like 'what we see corresponds 100% with external reality' and 'the researcher as a person does not play a role in knowledge acquisition'. However, these statements have been challenged by quantum mechanics. Hopefully my studies will assist scientists (including myself) to become aware of their largely unconscious assumptions (ordering principles) and to start to expand the scientific paradigm. Hopefully these attempts will help to facilitate intercultural understanding and polylogue, so a common ground can be found from which to co-create a sustainable world.

My vision relating to the research summarised below is that mind and matter interact with each other through electromagnetic wave phenomena and that through these, humans (and other organisms) have a strong connection with their environment. I suspect that, at a deeper level, mind-matter interaction takes place through an underlying field (at a deeper level than the electromagnetic field), like the zero point energy field known in quantum mechanics. This is independent of the question whether consciousness is self-existent and non-material or a product of biochemical processes. Mind may still result from material processes, but exert feedback on these. At present, this area (wave and resonance phenomena) is overlooked by most of (biomedical) science, which tends to focus on biochemical and pharmacological lock-and-key molecular processes in (part of) the organism, hardly, if at all, taking into account consciousness, wave phenomena, resonance and the environment.

In my opinion it is important that more research be supported and performed in this area, because it will provide valuable material to assist (world) society in its transition toward sustainability.

## **The studies**

My initial studies show different brainwave (electroencephalogram or EEG) frequency distributions over the human brain in different states of consciousness, resulting from various meditation and trance-induction (e.g. sound) methods. One of the most striking results was the finding of the sharp vertex wave, manifesting exactly on the top (crown or vertex) of the head in all EEG wavebands (delta, theta, alpha and beta, 0.5 to at least 30 Hz) at the moment subjects felt themselves starting to 'move' on an inner journey. In neurophysiology these waves are known to occur at the moment of falling asleep (Shagass, 1972) However, these subjects did not fall asleep but stayed conscious and experienced a journey.

Throughout the course of the day and during such exercises, the pineal gland, a small hormone gland in the centre of the brain, produces different hormones, regulating one's state of consciousness (Bosman, 2003). The pineal gland is connected to the optical nerves and receives information about the daily cycle of light and dark and about the seasonal changes in day length. It produces the hormone melatonin, derived from the essential amino acid tryptophan.

The pineal gland is hollow and connected with the third brain ventricle, filled with cerebrospinal fluid and is surrounded by blood in a sinus. The pineal gland secretes its hormones into the cerebrospinal fluid as well as the blood. All its hormones bind to the serotonin receptors, which are found in most parts of the brain. During the waking state at daytime until the evening, the pineal gland produces serotonin, a hormone which keeps us in the normal waking state. When darkness sets in, the serotonin is converted into melatonin by the pineal gland. Melatonin makes us increasingly sleepy until we fall asleep (Reiter, 1977). It has been suggested that just before we start dreaming, the melatonin is converted (again by the pineal) into pinolin, 5meo-DMT (5methoxy-DMT) and DMT (dimethyltryptamin), which are known to generate visionary activity (Callaway, 1988; Strassman, 2001) It has been argued that at least the latter three pineal hormones are able to enter cells and their nucleus and to intercalate with the DNA double helix, altering its spatial configuration and thus its pattern of gene expression (McKenna & McKenna, 1993). These insights and ideas about pineal activity come from many sources and are described in a literature study (Bosman, 2003).

In an experimental study the human pineal gland appeared to respond electrically to sound, which can be measured in the brain's magnetic field. Using a 180-channel SQUID device for neuromagnetometry and spatial filtering and statistical software we were, to our knowledge, the first worldwide to observe a tiny but significant response of the human pineal gland to click sounds (Bosman & van Dijk, 2005).

Later literature studies and experiments show evidence of coherence (similarity of rhythms, not necessarily of phase) among the electrical signals of various oscillators in the human body, including the heart and the brain. Electrical signals are used by all

neuronal networks that function as a brain for receiving, processing, storing and using information: the abdominal brain, the heart brain and the head brain. Coherence occurs when harmony is experienced between the physical, emotional, mental and inspirational levels of functioning (Reiter, 1977; McCraty, Atkinson, Tiller, Rein & Watkins, 1995; McMillin et al., 1999; Zohar & Marshall, 2001). This is also known as 'being in the flow', which promotes peak performance. This is implemented in some forms of coaching and training.

Currently I am studying possible synchronisation phenomena (similarity of frequency and phase) of brainwaves with the Schumann resonance (SR), a natural oscillating electromagnetic field in the Earth's atmosphere. Its frequencies are 8, 14, 20, 26, 33, 39, 45 and 51 Hz (very low frequencies). The Schumann resonance is maintained by thunderstorm discharges. This worldwide resonance phenomenon was discovered in the early fifties by the German physicist W.O. Schumann (Schumann, 1952; Schumann & König, 1954). From that time on similarities have been noticed between EEG recordings of human brainwaves and recordings of Schumann resonance waves in the atmosphere. It was suspected that human brainwaves synchronise, at least from time to time, with the Schumann resonance (König, 1974; Oschman, 2000).

The results of our study show preliminary indications that synchronisation of human brainwaves with first 2 modes (ca. 8 and 14 Hz) of the SR occurs spontaneously, although it varies from day to day and from individual to individual. Initial attempts have been made to carry out EEG-SR synchronisation biofeedback. This may be useful in health care, as 8 and 14 Hz brainwaves are associated with self-repair of the body and coordination of brain functions respectively. An interesting observation is that, when synchronisation was observed during relaxation, participants reported having felt a deep unity with and being part of nature (Bosman, Kostecky, Holtrop, Van Nuffel & Kroeks, 2004). Of course, caution in this type of research is needed, by studying what the brain really does to maintain health, as avoiding the SR frequencies from time to time (implying flexibility of the brain) may also have a biological function. In neurofeedback training (for clinical as well as peak performance purposes) flexibility of the brain in going from one frequency band to the other, is considered important for maintaining health and wellbeing.

Electromagnetic fields in the environment influence all living systems, which are electrical and magnetic themselves, thus interacting with the fields surrounding them. For instance a tomato plant or a tree are influenced by the electrical field around them, but because they also have their own electrical fields they change the field characteristics in their immediate vicinity. Order and richness in frequencies (1 Hz to several kHz) have been found around healthy plants, chaos and frequency gaps have been found in stressed and diseased plants by biologist Philip S. Callahan (1994, 1995). I have done various pilot studies on the electrical fields surrounding agricultural products, varying from milk to tomatoes and also water and trees. In many cases energetic agriculture was involved. Products experienced as more vital, and thus as having a higher quality, tended to show ordered, frequency-rich spectra and less vital products tended to have chaotic spectra, sometimes with gaps (a lack of peaks) in them in the frequency range of 1-30 Hz. More experiments need to be done before it can be concluded that general patterns exist, but the preliminary results are promising and may open up an interesting new research avenue in quantum agriculture (see

Kieft's paper). This method, combined with the study of circadian fluctuations in the bioelectric potentials of trees may also contribute to gaining insight into the 'cosmic' dimensions of trees (see Zürcher's paper).

In a wider field I cooperate in a study on weak natural light emission in humans. Photons originate in metabolism, but are highly coherent and possibly used by the cells for communication purposes. These studies are aimed at the possible relationship between photon emission, relaxation and stress (Van Wijk, Koch, Bosman & Van Wijk).

## **Discussion**

Biofeedback on coherence between, for example, the electrical fields of the heart and the brain enables individuals to learn to achieve coherence between mind and emotion, attaining more inner peace. Also, biofeedback between two or more individuals, to achieve coherence of heart rhythms, has been demonstrated to be possible and is experienced as increased connectedness. This is a powerful instrument for social learning. We suspect it is possible to increase synchronisation of brainwaves with the Schumann resonance using biofeedback. This could be a powerful instrument not only for (preventive) health care, but also for what could be described as 'environmental learning': as unity and interaction with nature on a deep level and being part of nature are experienced. These levels of biofeedback, played in the form of biofeedback games (software), may empower individuals and groups to take responsibility for their own health, for each other and for the environment.

In his paper, Henk Kieft mentions the interesting case described by the Swiss anthropologist Jeremy Narby. In his fascinating book Narby describes the astonishing practical botanical knowledge that shamans in the Amazon jungle have and how they obtain it, communicating with the global network of DNA-based life under the influence of ayahuasca tea (Narby, 1998). Narby in fact suggests that this experience is not dependent on ayahuasca, but on a trance-like, altered state of consciousness, that shamans in other societies also reach through practices such as drumming and dancing. On the one hand, this amazing shamanic plant knowledge, obtained without laboratory tests, cannot be ignored by science. In fact it is taken so seriously that pharmaceutical industries approach the shamans for help in finding medicinal plants in the jungle. On the other hand, the ayahuasca experience of the shamans and Jeremy Narby himself point to some kind of (possibly electromagnetic) emission by the DNA, which our brain may be able to make sense of.

Communication with DNA may not be such a crazy idea. Gariaev and his team found out that when a DNA sample is calmly spoken to, changes occur in its spatial conformation and thus its gene expression (Gariaev et al., 2000). Glen Rein et al. found the same effect even with loving intention, characterised by an internally coherent electrical field of the heart (Rein & McCraty, 1993). People trained in this internal coherence were better able to influence the conformation of a DNA sample than untrained participants. DNA emits various wavebands of electromagnetic radiation, at least in conjunction with proteins and water, as it is in the cell nucleus.

What Jeremy Narby describes may again be an example of field phenomena, which may help bridge the gap between science and intuitive knowledge. This case

should stimulate scientists to undertake a deeper study into how shamans (and people in general) obtain knowledge in an altered state of consciousness and also how living systems may transmit information to humans. The outcome could teach us about unsuspected possibilities of human consciousness and thereby expand the paradigm of science.

One important aspect of the above-mentioned altered state of consciousness is that a unity with nature is experienced. Recently some brain researchers have done studies on brain activity during such deep experiences of unity, or mystical experiences as these are also called. Andrew Newberg and Eugene D'Aquili at the University of Pennsylvania used imaging techniques to study brain activity in meditating Buddhists and praying Franciscan nuns. It was found that their transcendent experience of deep unity was solid and tangibly real, involving a chain of neurobiological events that could be measured, recorded and reproduced (Newberg, D'Aquili & Rause, 2001).

It is also known that the substance in ayahuasca that causes the alteration of consciousness in the Amazonian shamans is DMT, and that this is also produced by the pineal gland (possibly) just before dreaming sets in. This may also be what is happening during non-drug mystical experiences and near-death experiences (also often characterized by deep experiences of unity), as was one of the implications in the study on the effects of external DMT, done by Rick Strassman at the University of New Mexico School of Medicine (Strassman, 2001) The events going on in the brain or the above-mentioned chain of neurobiological events, are just starting to be mapped (Newberg, D'Aquili & Rause, 2001).

All studies mentioned above illustrate that electromagnetic fields and possibly also the underlying zero point energy field may be the bridge between consciousness and intuitive knowledge such as we find in anthroposophy, shamanism and intuitive agriculture and the 'hard', materialist science of atoms, molecules and bigger material structures (Laszlo, 1993, 2004; McTaggart, 2001).

## **Conclusions**

It is clear that science today is confronted with phenomena that cannot be explained in a mechanistic (Newtonian) or in a materialist, reductionist way. We are becoming aware that science is the way we, scientists, think and perceive and that this is largely unconsciously influenced by Western culture-specific tacit knowledge, hidden deeply within our minds. Our challenges today are:

- To bring this tacit knowledge, our deep unconscious programming to the surface through self-reflection and to become aware of it.
- To explore with an open mind those phenomena, which cannot easily be explained in what we presently know as a scientific way. In this way we are exploring the boundaries of the present dominant scientific paradigm.
- To be prepared to expand the paradigm through which we think about ourselves and about the world, even if it means opening up to other forms of knowledge besides scientific knowledge.

In the Miller-Bawden Quadrants (see Figure 1 in Niels Röling's paper) this would mean a shift from quadrant I (technocentric) to quadrant III (holocentric), in a worldwide intercultural sense. One paradigm is not better than the other, but these different paradigms are useful in different contexts.

This requires of us a readiness to change, not only as scientists, but also as human beings. I think this is a way for ourselves (and thus for science and technology) to escape from our present unsustainable spiral. It may offer a possibility for us as (Western) scientists to start a real dialogue with other cultures and with (other 'thought collectives' in) our own culture, learning from their knowledge. It may also offer us a possibility to discover the gems in the partly forgotten worldviews of our own, Western past. In this way we may be able to co-create a sustainable world.

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