



Hypothesis: The Electrophysiological Basis of Evil Eye Belief

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ABSTRACT

The sense of being stared at is the basis of evil eye beliefs, which are regarded as superstitions because the emission of any form of energy from the human eye has been rejected by Western science. However, brainwaves in the 1–40 Hertz, 1–10 microvolt range emitted through the eye can be detected using a high-impedance electrode housed inside electromagnetically insulated goggles. This signal, which the author calls “human ocular extramission,” is physiologically active and has distinct electrophysiological properties from simultaneous brainwave recordings over the forehead. Western science’s rejection of evil eye beliefs may be based on an erroneous rejection of a widespread component of human consciousness, the sense of being stared at, which may in turn be based on a real electrophysiological signal. The author proposes a series of future studies designed to determine whether human ocular extramission is the basis of evil eye beliefs.

KEYWORDS: human energy fields, evil eye beliefs, extramission theory, electrophysiology, western science



INTRODUCTION

Belief in *the evil eye* is not universal but is widespread throughout many different cultures, languages, and continents (Maloney 1976; Dundes 1981; Elworthy 2004). According to evil eye beliefs, a person can have a malevolent influence on another person, animal, object, or building by looking at the target. This can

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be done deliberately by individuals seeking to cast a spell, or unwittingly by individuals who are *jettatore* by nature.¹ There are innumerable amulets, rituals, practices, sayings, and counter-spells for the evil eye, and there are traditional practitioners who specialize in treating evil eye sickness. The symptoms of evil eye influence tend to be general malaise, headache, and digestive problems but can also include infertility and death.

Evil eye beliefs are an elaboration of “the sense of being stared at” (Sheldrake 2003, 2005a, b). Consciousness of another person’s stare is common, but cannot have any basis in physiological reality according to Western science; therefore it is maintained that evil eye beliefs cannot be based on anything other than superstition. All writers on the subject reviewed by the author (Toulmin 1953; Schrodinger 1967) agree that there is no basis in objective reality for the evil eye. For example, Schoeck stated that:

An enlightened executive in our society may suspect the encroachment of a subordinate who conceivably covets his job. Thereupon the executive develops stomach ulcers. In primitive culture our executive would believe that the envious subordinate shot him the evil eye.

There is, of course, no real link, no physical process between victim and jettatore. The whole drama takes place within the victim. [Schoeck 1981[1955]:199]

In the words of Winer and Cottrell:

Could an erroneous, ancient theory of visual perception still be a commonly held belief of children and adults at the end of the 20th century? A number of ancient philosophers, including Plato, Euclid, and Ptolemy, believed in what has been termed the extramission theory of visual perception. This extramission theory stressed that there were emanations from the eyes during the act of seeing. That is, essences or the like were thought to leave the eye during the act of visual perception. With advances in the sciences of optics and physiology, the extramission theory was replaced by what is called the intromission theory. This theory holds that there is only input to the visual system and that this information alone allows people to see. The extramission theory was ultimately put to rest in scientific and philosophical circles in the early 17th century, although informed opinion had generally dismissed extramission notions as early as the 13th century. [Winer and Cottrell 1996:137]

In a series of articles, Winer and colleagues (Winer and Cottrell 1996; Winer et al. 2002, 2003) differentiated two theories of vision: *intromission*, which is endorsed by Western science, and *extramission*, which is rejected by Western science. Winer and colleagues were dismayed that a substantial number of

college students believe in the extramission theory, and they call for better science education in an effort to correct this erroneous belief.

According to Western science, evil eye beliefs are *superstitions*. Anthropological study of evil eye belief, then, must focus on its cultural and social functions, origins, patterns of dispersal, and relationship with other beliefs and mythologies. The evil eye beliefs of “primitive” societies are considered superstitions by Western science because they are based on the extramission theory of vision:

An incautious person admired a string of twelve horses he saw one day; at once the bells on the two foremost horses shivered into a thousand pieces, but the horses themselves remained unhurt, the bells having attracted all the evil to themselves. The amulets, in short, are a species of lightning conductor, just as the power of overlooking is thought popularly to be a kind of electricity which resides in the eye. [Hardie 1981[1923]:112]

Evil eye beliefs must be validated if there is to be electrophysiological support for the extramission theory of vision. This does not mean that all components of evil eye beliefs, or all components of any extramission theory, would be scientifically validated, only that there would be a core physiological reality to support the extramission theory. One can regard rain dances as superstitions while accepting the reality of rain; and one can regard beliefs about evil spirits entering the soul through the eyes as superstitions while accepting the reality of intromission. Similarly, one can regard many evil eye beliefs as superstitious while recognizing that they give expression to an objective and accurate consciousness of extramission.

Rather than being *purely* superstitious, evil eye beliefs are a cultural elaboration of the sense of being stared at, which is based on subjective detection of extramission. This is a hypothesis in the anthropology of consciousness for two reasons: (1) it provides a fundamentally new approach to the study of evil eye beliefs, and (2) it provides a method for studying anthropologically determined limitations in the consciousness and world view of Western scientists.



EXPERIMENTAL DATA SUPPORTING THE EXTRAMISSIION THEORY OF VISION

The author hypothesized that there is validity to the extramission theory of vision; that extramission and intromission are not necessarily mutually exclusive models. Beliefs in the evil eye are derived from an objective physiology that is consistent with extramission theory according to the theory of human energy fields (Ross 2009). The author also hypothesized that human extramission is

composed of electromagnetic radiation in the same frequency range as the general field that emerges through the skull: 1–40 Hertz and 1–100 microvolts. Recent developments in sensor and amplifier technology have made it possible to detect the electrocardiogram remotely at a distance of one meter, and the electroencephalogram at a shorter distance (Prance et al. 2000, 2008; Harland et al. 2002a, b). Because the electromagnetic field of the brain emerges through the skull and is detectable remotely, the theory of human energy fields predicts that human ocular extramission can likewise be detected remotely. Because ocular extramission does not have to pass through the skull, it is predicted to have greater amplitude than the general field emerging through the skull. The amplitude might also be increased by the geometry of the skull, the presence of the optic nerve terminal at the retina, and conscious focusing and attention.



MATERIALS AND METHODS

The EEG neurofeedback equipment used in this study was an Atlantis II biofeedback unit and its accompanying software from <http://www.brainmaster.com>. Except for the high-impedance electrode, all other electrodes used were conventional silver chloride electrodes purchased from the same supplier. The high-impedance electrode consisted of a planar array fabricated using custom silicon-based printed circuit techniques. The multielectrode array had a single 235-micrometer shank, 15 micrometers thick, with 64 sites arranged on the shank. The multielectrode array was then bonded to a printed circuit board with a Samtec connector. The 64 sites on the Samtec connector were then shorted with solder and attached to custom EEG cables, effectively making the multielectrode array one single electrode of 64 distinct contacts with a collective site size of $(64 \times 177 \mu\text{m}^2) = 11,328 \mu\text{m}^2$. Impedance of the electrode in physiological saline was 30 kilohms. Impedance of the electrode in air was not taken, but is assumed to be in the giga-ohm range.

The high-impedance electrode was placed on the inside of the right lens of a pair of goggles. The electrode was mounted such that it was about two centimeters in front of the right iris of the test subject, a 58-year-old Caucasian male. In order to obtain sufficient electromagnetic insulation to be able to detect a signal, the right front lens of the goggles was covered with multiple layers of aluminum foil and copper wire mesh. A ground electrode was placed on the left mastoid. For Channel 1, a reference electrode clip was placed on the right ear lobe and the active electrode was inside the goggles. For Channel 2, a reference electrode clip was attached to the left earlobe and the active electrode was placed above the right eyebrow at Fp2. Exterior and interior views of the goggles



FIGURE 1. HUMAN OCULAR EXTRAMISSIION DETECTION GOGGLES, EXTERIOR VIEW

are shown in Figures 1 and 2. Nine 3-second readings were taken from both channels with eyes closed, and nine 3-second readings from both channels with eyes open. During all readings the participant's facial musculature was still.

The mean (SD) amplitude in microvolts in each frequency range over the nine runs was calculated for both the eyes-open and eyes-closed conditions. Mean amplitudes for each location, frequency range, and condition were then compared with each other using *t* tests. Significance was set at $p < .05$.



FIGURE 2. HUMAN OCULAR EXTRAMISSIION DETECTION GOGGLES, INTERIOR VIEW

TABLE 1. MEAN (SD) AMPLITUDE READINGS (μV) OF OCULAR EXTRAMISSION AND ON THE SCALP (FP2) WITH EYES OPEN AND CLOSED

Ocular Extramission					
Delta ^a					
	Delta ^a	Theta ^a	Alpha	Beta	Gamma ^a
	(1–4 Hz)	(4–8 Hz)	(8–12 Hz)	(13–21 Hz)	(28–42 Hz)
Eyes open	8.46 (4.89) ^b	5.35 (2.09)	5.48 (3.16)	7.94 (3.46) ^b	2.36 (1.23) ^b
Eyes closed	3.73 (1.65)	2.60 (1.69)	3.32 (1.78) ^b	7.35 (3.67) ^b	1.23 (0.41)
Fp2					
	Delta	Theta	Alpha ^a	Beta	Gamma ^a
Eyes open	4.23 (1.02)	3.93 (1.31)	4.01 (1.49)	4.00 (1.59)	1.21 (0.36)
Eyes closed	3.82 (0.64)	3.70 (1.56)	6.63 (2.03)	4.13 (1.12)	1.66 (0.53)

^aEyes open and eyes closed conditions differ at this electrode location at $p < .05$.

^bOcular extramission and Fp2 differ at $p < .05$.

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RESULTS

The results of the recordings are shown in Table 1. Statistical data for the significant differences in the ocular extramission signals, comparing the eyes open and eyes closed conditions were: delta, $t(16) = 2.75$, $p < .02$; theta, $t(16) = 3.07$, $p < .008$; and gamma, $t(16) = 2.61$, $p < .02$. At Fp2, statistical data for the significant differences comparing the eyes open and eyes closed conditions were: alpha, $t(16) = 3.12$, $p < .007$; and gamma, $t(16) = 2.11$, $p < .05$.

Comparing the ocular extramission with the signal at Fp2, in the eyes open condition, significant differences were: delta, $t(16) = 2.54$, $p < .03$; beta, $t(16) = 3.10$, $p < .007$; and gamma, $t(16) = 2.69$, $p < .02$. Comparing the ocular extramission to Fp2 in the eyes closed condition, significant differences were: alpha, $t(16) = 3.68$, $p < .002$; and beta, $t(16) = 2.52$, $p < .03$.

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IMPLICATIONS OF THE ELECTROPHYSIOLOGICAL BASIS OF EVIL EYE BELIEF

Human ocular extramission can be detected at short range in an electromagnetically insulated environment using a high-impedance electrode. The results of the recordings demonstrate that an electromagnetic signal emerges from the eyes, and that in some frequency ranges it has greater amplitude than the field

emerging through the skull, which is consistent with the author's hypothesis. Human ocular extramission has distinct electrophysiological properties compared with the signal read by an electrode at Fp2. It demonstrates reversed blocking in delta, for instance, while conventional alpha blocking and no delta blocking are observed at Fp2. Alpha blocking is well recognized in the neurofeedback literature (Demos 2005) and can be detected remotely using high-impedance electrodes that make no physical contact with the person (Harland et al. 2002a).

The fact that human ocular extramission is composed of electromagnetic radiation in the frequency range sampled by neurofeedback equipment does not mean that higher frequency components do not exist, and does not imply that additional, as-yet-unmeasured signals are not emitted in tandem with the components in the 1–40 Hertz range. Shelldrake and Bohm (1982) discussed Shelldrake's theory of morphogenic fields: Shelldrake proposed that these as-yet-unmeasured fields underlie and provide the mechanism for the sense of being stared at and other phenomena regarded as paranormal, such as mental telepathy and clairvoyance. The measurable component of ocular extramission in the 0–40 Hertz range could be considered to be a special limited instance of the larger theoretical category of morphogenic fields. Extralow frequency electromagnetic radiation emitted through the eyes cannot account for the possibility that the sense of being stared at can be transmitted through video cameras and electronic circuits, as described by Shelldrake (2003, 2005a, b), however. This phenomenon would require a property of morphogenic fields not possessed by conventional electromagnetic radiation. The advantage of studying the component of human ocular extramission that can be measured with existing technology is that it transforms the sense of being stared at into a testable scientific theory.

In terms of the anthropological study of evil eye beliefs, then, there is now a testable scientific hypothesis about the electrophysiological basis of evil eye beliefs, because there is a detectable electromagnetic signal emerging from the eyes. Further electrophysiological study should focus on the amplitude, polarization, coherence, frequency, and other properties of the signal, and particularly its range of propagation. For human extramission to be detectable by a human target, the signal must travel at least tens if not hundreds of meters in the natural environment.

One might think that ocular extramission could not be the mechanism underlying the sense of being stared at due to the inverse square law, according to which the power density of any electromagnetic signal decreases with the square of the distance. However, this does not apply to extralow frequency radiation in the range sampled by neurofeedback equipment. Barr et al. (2000) state that, "In the lower ELF field, the attenuation suffered by globally propagating electromagnetic waves is extraordinarily small. It amounts to only 0.3 dB/

1,000 km at 10 Hz, increasing with frequency to 1 dB/1,000 km at 60 Hz.” Decibels (dB) is the unit for attenuation. In terms of electromagnetic signaling between biological organisms, for all practical purposes, the attenuation of ocular extramission at ecologically relevant distances is negligible. This means that extramission is a realistic candidate for the underlying mechanism of the sense of being stared at. Additionally, common sense would lead one to conclude that if an astronaut on the moon can maintain voice communication with the earth, then digitized electromagnetic signals containing information could be transmitted and received in the biosphere over distances of hundreds of meters.

One might also consider the possibility that the signal being detected is not really coming from the brain, but either from the retina or the eyeball. Conventionally, electroretinography involves stimulating the retina with light in order to trigger release of photons by the retinal tissues (Fulton et al. 2003). As the ocular extramission in the present study is detected in complete darkness inside goggles, the mechanism of conventional electroretinography cannot be contributing to the signal. The size of the microelectrode relative to the retina is not a relevant technical consideration for this reason. Even if there is a small contribution from the retina, however, that would not alter any ecological function of extramission.

Future research on human ocular extramission should include large samples of subjects. Additionally it would be of interest to study the electrophysiological properties of ocular extramission in individuals with a variety of different medical diseases and psychiatric disorders, including multiple sclerosis, macular degeneration, congenital blindness, enucleation of an eyeball, traumatic injury to the visual cortex, and conversion disorder blindness. Subjects could be studied while in different psychophysiological states including being drowsy, in a coma, asleep, or highly anxious.

Future research could address whether members of some cultures have lower average thresholds for the sense of being stared at than members of other cultures, which could in part be a function of local variations in the earth’s geomagnetic field, or, in the modern world, the amount of ambient electromagnetic pollution in the area. The decay of evil eye beliefs when people emigrate to an urban Western culture might in part be due to the signal for extramission sinking below threshold in the electromagnetically polluted environment of a big city. This possibility does not exclude the causal influence of cultural forces in decay of evil eye beliefs.

There may be a zone of subliminal subthreshold extramission detection that can be documented with galvanic skin response, heart rate variability, and other physiological measures. The theory of human energy fields (Ross 2009) proposes that the ability to detect extramission was selected for over a millennia in predator–prey interactions. A gazelle that could register the stare of a lion, even

if this occurred only subliminally as a sense of unease, could take evasive action and the associated genes would be selected for. In human beings, subliminal detection of extramission might likewise generate a sense of danger, malaise, or unease that could then be culturally transformed or psychologically amplified into the typical symptoms of evil eye sickness.

Human ocular extramission may be one example of a general electromagnetic field emitted from the heart, abdominal plexes, other body locations, and the body as a whole. According to the theory of human energy fields, reductionist biological models of the brain–mind field should be replaced with a telecommunications model, because a telecommunications model generates a wide range of testable hypotheses that are not possible within a bioreductionist model. For instance, it is possible that a medicine man may emit a focused electromagnetic signal during a fertility ritual that actually increases the germination rate of seeds in a field. This is a testable scientific hypothesis because an electromagnetic gun that mimics the emission of the medicine man could be used to affect germination rates in a hydroponic garden.



CONCLUSION

A wide range of beliefs in spirits could provide us subjective, culturally transformed testimony concerning the interaction of human beings with electromagnetic fields in the environment. The entire biosphere is built on the interaction of organisms with extremely weak natural electromagnetic signals—for example, the synthesis of chlorophyll by plants requires that the plant capture photons and harness their energy to drive biological processes. Similarly, human beings capture photons in order to synthesize vitamin D. Photons in the visible range are only a tiny subset of the sea of electromagnetic information in which all life forms have evolved for a billion years. We should listen for the testable theories of electromagnetic field interactions hidden in a wide range of rituals, beliefs, experiences, and practices. The theory of human energy fields leads to a wide range of studies that marry anthropology and electrophysiology. The electrophysiological basis of evil eye belief is but one example of the general theory.



NOTE

1. *Jettatore* is the Italian word for individuals who have the power to cast the evil eye.

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