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Quantifying the field effects of consciousness:

From increased EEG coherence to reduced international terrorism

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Abstract

This paper reviews the methodology and results of nine key studies from a body of 50 studies demonstrating field effects of consciousness through the Transcendental Meditation technique (TM). Retrospective studies found reduced crime rate and decreased crime rate trend in 24 cities after 1% of their population learned the TM technique, controlling for demographic correlates of crime. Causal analyses of random samples of 160 US cities and 40 Standard Metropolitan Statistical Areas over a seven-year period found stable causal structures in which the percent of the urban population practicing the TM technique predicted reduced crime in subsequent years, but not the other way around, controlling for 13 crime-correlated demographics. A physiological study suggested that during Yogic Flying by a group of 2,500, EEG coherence increased between three individuals at a distance of over 1,000 miles away. Increased EEG coherence in a single Yogic Flier predicted increased EEG coherence in a non-meditator in the next room. The size of a group practicing the TM and TM-Sidhi techniques predicted changes in the stress hormone cortisol and in 5-HIAA, the main metabolite of serotonin in non-meditators working within a 20-mile radius of the group. TM and TM-sidhi groups of the square root of 1% of the world population (approximately 7,000 in the mid 1980's) predicted decreased international conflicts and terrorism on a global scale, using data bases from independent scholars who are in no way connected with this research program. The paper concludes that there is strong cross-validating evidence from a wide variety of sources that the TM and TM-Sidhi program is an effective technology for reducing and preventing international conflicts and terrorism.

Introduction

When we started our research on field effects of consciousness 27 years ago, the biggest barrier was conceptual—how could we understand people interacting with each other at a distance? Of all the research on meditation, this posed the biggest threat to most scientists' world-view. Today there is a wide range of converging evidence for the phenomenon, much of it by people at this conference. But it still remains a threat to many, and with good reason. None of the four basic physical fields—electromagnetism, weak interaction, strong interaction, or the gravitational field— seem plausible candidates for mediating the effect. The electromagnetic field generated by the nervous system is many orders of magnitude too small to plausibly explain how people on opposite sides of the world could directly affect each other. The strong and weak forces operate within the atomic nucleus, and the force of gravity between two individuals is too weak to have a measurable effect.

Our view is that the phenomenon takes place on the level of the unified field underlying the four fundamental forces.¹ The hypothesis guiding our research program posits a field of “pure consciousness”, which links all individuals and everything in the universe. This is the perennial philosophy, whose theoretical and practical ramifications are perhaps most completely elaborated in the Vedic tradition of India. Maharishi Mahesh Yogi, the foremost modern exponent of the Vedic tradition, maintains that the unified field of natural law glimpsed by modern physics is the infinite, eternal field of pure consciousness.²⁻⁵ In this view, the laws of nature that govern all forms and phenomena in the universe arise from the self-interacting dynamics of pure consciousness. These basic laws of nature have been cognized by the great Vedic rishis as the Veda.

“Veda” is the Sanskrit word for “knowledge” and its deepest meaning is the field of pure knowledge, the total potential of natural law at the basis of the universe. The Vedic literature is a sequentially expanded elaboration of natural law expressed in the Veda. Quantum physicist John Hagelin has shown detailed parallels between the structure of natural law in the Vedic description and the structure of natural law in modern super-symmetric unified field theory.⁶ Physician and neurophysiologist Tony Nader has shown that the human physiology is a perfect replica of the structures and functions of natural law described in the Veda and Vedic literature.⁷ As is the macrocosm, so too is the microcosm. Nader has mapped all of the branches of the Veda and Vedic literature onto the various structures of the brain and nervous system. A practical implication of this knowledge for medicine is that the specific sounds of the Veda and Vedic literature can be used to create balance and health in their corresponding physiological counterparts.^{8 9}

This field-theoretic view of consciousness has a long tradition and profound practical implications. In the Vedic tradition of India, five thousand years ago Maharishi Patanjali's Yog Sutras, stated “tat-sannidhau vaira-tyagah” (Yoga Sutra, 2.35)¹⁰, “In the vicinity of Yogic influence — unifying influence, integrating influence, coherent and harmonious influence — conflicting tendencies do not arise” For Patanjali, the word “Yoga” means the “union” of the localized individual mind with the cosmic mind, pure consciousness. Where is pure consciousness located and how can the individual mind experience it? Patanjali is clear on this point: “yogas chitta-vrtti-nirodhah”— “Yoga is the least excited state of mind” (2:1). Pure consciousness is no further away than the silent basis of every individual's mind, the

Self, capital “S”, of all beings, the knower within all of us who looks out onto the world. Yet, in ordinary active states of consciousness, such as those involved in thinking, perception, and feeling, the objects of awareness dominate attention and the silent inner knower is missed, just as one misses seeing one’s own glasses when looking through them.

Maharishi explains that to gain union of the individual mind with the cosmic mind, one must let the individual mind transcend its own activity to experience its own non-active state of restful alertness.³ Maharishi’s Transcendental Meditation technique effortlessly leads the mind to progressively finer levels of thought until it transcends the finest level and attains the self-referral state, transcendental pure consciousness. Techniques that require contemplation or concentration keep the mind “object-referral”, i.e., localized on the object of attention. Because they require mental activity, they are counterproductive to transcending thought. They are like stirring up waves on the ocean of consciousness. In contrast, the Transcendental Meditation technique allows the mind to transcend activity to experience self-referral consciousness, which is unbounded awareness. It is like the waves of the ocean of consciousness settling down to a flat, unbounded, still surface. Unbounded awareness is experienced as infinite and eternal, because that is the fundamental nature of consciousness.¹¹ Bringing conscious awareness back onto itself, the unified field of natural law holistically integrates all aspects of the mind and body in the individual. Consequently, the individual’s behavioral and abstract, unmanifest contributions to the collective consciousness of society become more coherent.¹²

In accordance with a general principle in science that the coherent elements of a system have a more powerful effect than the incoherent elements, as early as 1960 Maharishi predicted that approximately one percent of a population practicing the Transcendental Meditation technique would be enough to have a measurable increase in the coherence in the larger society. In the mid 1970’s Maharishi introduced the more advanced TM-Sidhi program in which one exercises various mind-body systems from within transcendental consciousness. The most powerful of these techniques is Yogic Flying. He estimated that as little as the square root of one percent of a population practicing the TM and TM-Sidhi program in a group would be enough to create a measurable influence of harmony in society. This smaller requirement of advanced meditators needed to create an effect made the phenomenon easier to study. Both predictions have been experimentally supported, as we will summarize below (also see reviews^{13 14}). Social scientists named this phenomenon the Maharishi Effect to honor Maharishi who predicted it and provided the technology for its implementation, and by implication, to honor all the Maharishi’s of the Vedic tradition who have preserved the purity of this knowledge of enlightenment throughout the centuries.¹⁵

Over 600 research studies conducted in 200 universities and research universities in 33 countries demonstrate that the practice of the TM and TM-Sidhi program creates coherence in the individual, and approximately 50 studies on the field effects of consciousness have found beneficial effects on the larger society.¹⁶⁻²⁰ Most studies of field effects have directly tested the hypothesis of reduced hostility in the environment, as indicated by sociological measures such as decreased crime rate, reduced war intensity, and decreased international terrorism. Three studies have observed “mediating” physiological effects using EEG coherence and biochemical stress markers (cortisol and serotonin). The following is a summary of nine key studies, in more or less historical order.

1) Crime Rate in forty-eight US cities—A Retrospective Study: 1972-1977.

This study included all twenty-four cities with populations 10,000 to 25,000 in which 1% of their population learned the TM technique by 1972. These experimental cities were compared to twenty-four control cities, which were selected by an independent investigator prior to collection of the last several years of data. Matching variables were total population, college population, and geographic region.²¹ The study examined change in the Federal Bureau of Investigation total crime index in 1973, the year after the 1% cities reached 1%, and studied the change in crime rate trend for six post-intervention years from 1972–1977. Change in crime rate in 1973 was assessed by the difference in the actual 1973 crime rate from the level predicted by linear regression on the six-year pre-intervention baseline period from 1967–72. Change in crime rate trend was assessed by comparing the slope of regression on the post-intervention period with the slope for the pre-intervention period.

In 1973 there was a significant decrease in crime rate by 18% ($p < .002$) in 1% cities relative to controls. In addition, the post-intervention slope of the crime trend for the 1% cities decreased compared to an increase in the slope in the control cities ($p < .002$, see Figure 1). This demonstrates that the Maharishi Effect is immediately apparent as well as apparent as a long-term effect that persists over many years.

Methodological considerations: A strength of this and most of the subsequent research on sociological variables is that the data are public and available to everyone. Also, the FBI Uniform Crime Reporting system has standardized the definitions of the categories of crimes nationwide. A source of error is that only about half of crimes committed are ever reported. However, it can be assumed that this source of error is randomly distributed throughout experimental and control cities. Another problem is that many changes in the reporting procedures, such as computerization, affect the data. Because this study took place in a period when cities of this size were increasingly complying with FBI standards for reporting to the Uniform Crime Report index, a second analysis was conducted on a reduced sample of 20 1% and 20 control cities, which eliminated all cities which showed a sudden increase in crime that might have been an artifact due to a change in police reporting procedures. The results for this reduced sample were similar to the whole sample; a 22% decrease in crime in 1% cities in 1973 compared to an increase by 2% in control cities ($p < .005$), and a reduction in crime rate trend in the 1% cities by 89% compared to an increase of 53% in control cities ($p < .05$). In addition, a significant correlation was found between percentage of TM participation in each city in 1972 and crime rate change in 1973 ($r = -.53$, $p < .001$) and change in slope ($r = -.41$, $p < .01$).

With regard to the independent variable, the number of people learning the TM technique in the cities was collected by the TM organization independently of the hypothesis of the experiment or knowledge of crime rates in the cities. Local records were updated when people moved.

The main methodological issue is whether a third possible variable may have caused both increased TM numbers and decreased crime. The study attempted to address this problem by statistically taking into account the effects of the major demographic variables known to be correlated with crime rates. Stepwise discriminant analysis showed that 1% cities and control cities were similar on per capita income, percentage of persons aged 15 to 29, stability of residence, percentage unemployed, and percentage of families with incomes below poverty level, all known to be correlates of crime. Analysis of covariance was used to control for the

effects of two crime-related variables on which the two groups of cities did differ, median years education and pre-intervention crime rate slope.

However, a causal interpretation would certainly be strengthened by a randomized experiment. Randomization in this case would mean either randomizing which cities had meditators and which cities did not, by pre-selecting cities and then teaching meditation only in randomly selected experimental cities, or by taking all the 1% cities and having the people in randomly selected experimental cities meditate and then having the controls not meditate for a year. It would be very expensive to teach 1% in several cities, but not impossible. With regard to the second suggestion, given that the practice has wide ranging benefits, it would be unethical to ask people not to meditate. In any event, to our knowledge there has never been a true randomized study on this scale in the history of the social sciences.²² In the context of current events, we could randomly assign cities at risk for terrorist attacks, stratified for degree of risk, and assign them to experimental and control groups and see whether TM participation reduces the incidence of risk of terrorism over a five-year period. But as we shall see, the more powerful TM-Sidhi technique would be easier to implement in such an experiment.

2) Crime in 160 US Cities—A Causal Analysis: 1972-1978. To strengthen a causal interpretation using archival crime data, Dillbeck and colleagues conducted causal analyses on large random samples of 160 cities and 40 standard metropolitan areas over a fifteen year period.²³ Causality implies lagged-correlation, i.e., the cause should precede the effect in time.²⁴ One type of causal analysis, called cross-lagged panel correlation, compares the synchronous correlation (the correlation between two variables at the same time) with the lagged correlations (the correlation of a variable with another variable at earlier and later times). The hypothesis that A is causing B is supported if variations in A are followed in time by correlated changes in B, whereas changes in B are not followed in time by correlated changes in A, assuming that the synchronous correlations at both time periods are equal.²⁵

Crime data is only readily available for cities on a yearly basis, so only relatively slowly evolving processes can be studied using this data. However, yearly data should be expected to capture the dynamics of the prediction that rising numbers of TM participants would cause a decline in crime rate in subsequent years. This prediction was tested in a stratified random sample of 160 US cities, which was comprised of 40 cities in each of 4 population groups—greater than 250,000; 100,000 to 250,000; 50,000 to 100,000; and 25,000 to 50,000. This sample comprised 25% of the total urban population of the United States (1970 census). The study was from 1964 to 1978. As before, FBI total index crime data were used.

For each city, a trend line was calculated that represented changes in crime rate from 1964 to 1971, before significantly large numbers began practicing the TM program in the United States. The trend line was projected from 1972 to 1978 to predict what the crime rate might have been had the earlier trend continued. The trend of increasing crime seen from 1964 to 1971 was predicted to continue in the period from 1972 to 1978 in cities with low percentages of TM participants. However, in the cities with high percentages of TM participation, the slope of the crime-rate trends were predicted to decline below the previous slopes. The assumption of stationarity was tested and upheld.

All but one of the crossed-lagged differences were in the direction that would be predicted by the hypothesis of TM program causality (p's ranged from <.01 to .05).

Methodological considerations: Was the effect due to a third unknown variable? Partial correlations were used to control ten specific social variables known to influence crime—median years education, percent unemployed, per capita income, percent of families in poverty, stability of residency over five years, median age, percent over age 65, population size, population density, and ratio of police per population. However, the possibility of a third causal variable, however remote it may seem, can not be completely ruled out without true randomization.

Because some of the smaller cities in the random sample could have been part of a larger metropolitan area, a second cross-lagged panel analysis was conducted using Standard Metropolitan Statistical Areas (SMSA).

3) 80 US Standard Metropolitan Statistical Areas (SMSAs)—A Second Causal Analysis: 1972-1979. Using the same causal analysis as above for the 16 year period from 1964 to 1979, a second study was conducted on a random sample of 80 SMSAs constituting 55% of the SMSAs with over 200,000 population. This sample included 47% of the total metropolitan population of the United States. The results were essentially the same as with the other cities studied; a stable causal structure was found that supported the hypothesis that the TM practice in a population reduces crime rate. Both raw correlations and partial correlations, which controlled for other variables known to influence crime, showed that level of TM participation predicted reduced crime in subsequent years ($p < .01$ for each year). The magnitude of the correlations of TM leading crime decrease were small, an average of $-.22$, accounting for 5% of the total variance. However, a correlation of this magnitude is equivalent to an improvement of 17.6% in a dichotomous outcome variable (e.g., cure rate) due to a treatment²⁶.

7) Washington, DC—Decreased Violent Crime: 1993. This study was a prospective experiment in which a group of approximately 4,000 participants in the Transcendental Meditation and TM-Sidhi programs assembled in Washington, DC, from June 7 to July 30, 1993. The District of Columbia Metropolitan Police Department (DCMPD) provided weekly crime data from a database used for their FBI Uniform Crime Reports. The study statistically controlled for the effects of weather variables, daylight, historical crime trends and annual patterns in the District of Columbia, as well as trends in neighboring cities.

Time series analysis of 1993 data showed that homicides, rapes and assaults (HRA) crimes dropped significantly during the Demonstration Project, corresponding with increases in the size of the group. The maximum decrease was 23.3%, $p < 2 \times 10^{-9}$, (24.6% using a longer baseline, with 1988-1993 data, $p < 3 \times 10^{-5}$), coincident with the peak number of participants in the group during the final week of the assembly. No significant decreases in HRA crimes were found during the same period in each of the five previous years. Nor could the effect of the coherence-creating group on reducing HRA crimes be accounted for by additional police staffing. The results for HRA crimes were highly robust to alternative time-series model specifications, and showed that the effect of the group size was cumulative and persisted after the Demonstration Project ended. Calculation of the steady-state gain based on the time-series model predicted that a permanent group of 4,000 coherence-creating experts in the District would have a long-term effect of reducing HRA crimes by 48%.⁵²

It should also be noted that another major purpose of the project, which was lodged in advance, was to create coherence for the government. During the project, a floundering Clinton administration suddenly began to make progress. On July 18th, journalist Sally Quinn wrote in the Washington Post : "Well, in case anyone hasn't noticed, Washington is in

a lull, at least from the vantage point of the inmates.... the Clinton administration appears to have revived....But such a swift reversal of political fortune is not easy to account for. The inmates may logically wonder whether Clinton really turned things around or if something else is going on...almost mysteriously and almost overnight, in the face of government distress..." (p. C1).53

This change was also observed from inside the White House. Clinton's special assistant and White House press secretary, George Staphanopoulos, wrote of that period that by the Fall of 1993, the Clinton White House had found its footing. It held the Middle East peace ceremony, passed NAFTA and the Brady bill, got its economic plan through and had proposed the centerpiece of its domestic agenda: Health-care reform.⁵⁴ Coincident with the onset of the Demonstration Project Clinton's approval rating increased ($p = 5.29 \times 10^{-8}$), media positivity increased towards the president ($p = .01$) and all five available indicators of social stress in the District decreased: emergency psychiatric calls ($p = .009$), hospital trauma cases ($p = .02$), complaints against the police, ($p = .01$), accidental deaths ($p = .05$), and a social stress index of the four ($p = 3.22 \times 10^{-5}$).⁵⁵ 56

Methodological issues: An important issue in intervention studies of this kind that claim to produce broad positive sociological change is to lodge the predictions in advance with outside scientists and policy makers. The hypothesis that levels of violent crime in the District of Columbia would fall substantially and harmony in government would increase during the Demonstration Project was posited with a 27-member Project Review Board comprised of independent scientists and leading citizens. The Board approved the research protocol and monitored the research process.

The following studies are presented last because they take our discussion of field effects from the individual and urban levels to whole nations, international conflicts, and terrorism.

8) Israel—Decreased Crime and Improved Quality of Life in Jerusalem and Israel as a Whole and Decreased War Intensity in Lebanon: 1983. This project was a critical experimental demonstration of the Maharishi Effect on armed conflict in a major trouble-spot area: the civil war in Lebanon. The experiment created a group of resident Israeli TM and TM-Sidhi experts in Jerusalem at an arbitrarily picked time (July and August 1983) to test the effect of the group on crime and the quality of life in Jerusalem and Israel as a whole, and on the war in neighboring Lebanon. The major hypotheses and the proposed categories of measurements were lodged in advance of the experiment with a group of research scientists in the U.S. and Israel. Upon arrival in Israel, the authors met with Israeli scientists to finalize selection of a smaller subset of measures.

The analysis of the results used all of the non-redundant daily time-series data available at the time of departure of the researchers from Israel in the fall of 1983; these included eight social indicators: (1) crime in Jerusalem, (2) crime in Israel as a whole, (3) automobile accidents involving personal injury in Jerusalem, (4) fires in Jerusalem, (5) a stock index of all freely traded stocks on the Tel Aviv stock exchange, (6) a national-mood scale derived from content analysis of a major newspaper, (7) reported war deaths of all factions in the Lebanese war, and (8) a war-intensity scale of the Lebanese war derived by newspaper content analysis.

The critical thresholds of TM and TM-Sidhi participants needed for Jerusalem, Israel, and Lebanon were calculated at 65, 122, and 197, respectively, which took into account the number of meditators already in the area. The size of the experimental group actually

fluctuated between 65 and 241, due to the varying degrees of ability of individuals to leave their jobs and families to participate in the study.

Time series transfer function analysis of daily data indicated that crime decreased by 7.4% in Jerusalem ($p = .023$) and by 4.1% in Israel as a whole ($p = .022$). When the group was largest, the war in Lebanon was impacted, as seen by decreased war deaths (by 75.9%, $p = .019$) and war intensity ($p = .0045$).⁵⁷

In the study in Israel, the effects were generally stronger for composite quality of life indices than for individual measures. The Overall composite index of all variables showed an increase of 1.69 standard deviations. The stronger results for the indices than for the individual variables suggests the presence of a common influence of coherence acting on all the variables at once. This was most clearly seen when the common variance was enhanced and random components were canceled through signal averaging. This result supports the hypothesis that the TM and TM-Sidhi techniques operate to create coherence on a fundamental, unifying level of natural law.

Methodological issues: A secondary analysis of the data indicated that decreased war in Lebanon was a robust finding, statistically significant for 14 different specifications of the noise model. In fact, using the objective AIC criteria of best noise model choice (the model that gave the most predictive power with the least number of parameters), the best model gave the strongest intervention effect.²² This indicates that the result was not a spurious artifact of autocorrelation.

Perhaps the single most important issue in studies that make unusual claims is replication. This result of decreased war in Lebanon due to groups practicing the TM and TM-Sidhi program has been replicated seven times using a daily data base constructed from many media sources representing all factions in the war by an expert in the war who was blind to the experimental hypothesis.⁵⁸ In addition, the general principle of the Maharishi Effect has been replicated 50 times,^{14 59} and is supported in principle by completely independent researchers, who find evidence of action-at-a-distance in a variety of different paradigms.

9) Decreased International Terrorism: 1983-1985. Terrorism is crime committed for political purposes, often on the international level. This study was observed the impact of three large assemblies approaching $\sqrt{1}$ % of the world population for the world ($n = 7000$). The dependent variable was casualties and injuries due to international terrorism obtained from the Rand Corporation data bank for 1983-1985, aggregated into five-day periods. Using time-series intervention analysis to estimate the combined effects of the assemblies, the study found a significant reduction by 72% in worldwide terrorism after the beginning of the assemblies ($p < .025$).⁶⁰ The study also found significant decreases in international conflicts during the assemblies, as indicated by content analysis of major newspapers. Other research using independent data bases has also found significant reductions in international conflicts by large groups of TM and TM-Sidhi participants.^{56 61-63}

Methodological issues: A statistical difficulty in studying terrorism is non-stationarity of the data. Many days or weeks may go by with no event, and then a momentous event kills thousands, creating a data series that violates the assumption of normality. In the present study we found that aggregating the data into five-day periods smoothed it out and also eliminated any possible 7-day weekly cycles that might be in the daily series.

Where we stand now. With respect to this research, we have always taken the stance of defenders of Type II error, cautioning not to dismiss a phenomenon that may be beneficial to society just because it is difficult to explain by the current dogma of science. Others, including editors, peer reviewers, conference organizers, national review committees, have most often taken the stance of defenders of Type I errors, cautioning against admitting this evidence into the body of science.⁶⁴ In the early days their first line of defense was to simply ignore this research. Often it was summarily denied publication, on such grounds as “not being appropriate for this journal” or “supporting hypothesis outside the realm of normal science”. And in science, if something is not published, it does not exist. No one has to take it into account. As times changed, and as our research became more compelling, and as new journals arose that reflected rising world consciousness, some papers finally got published. Some fought vigorously to make this phenomenon disappear, and when criticisms were met and it didn’t disappear, they went back to simply ignoring it.^{64 65}

On September 11 we had a wakeup call. It is time we give this research the objective consideration that it deserves and that the world desperately needs. A group of scientists is going to our government with a proposal for trying this technology to reduce and prevent terrorism. Just as Einstein went to Roosevelt with a group of scientists to encourage development of an atomic technology, Dr. John Hagelin, a leading quantum physicist and Director of the Institute of Science, Technology, and Public Policy, Dr. Peter Salk, vice president of the Jonas Salk Foundation, Dr. David Edwards, professor of government at the University of Texas, and other concerned scientists have been meeting with members of Congress and the Cabinet about implementing this new defense technology.⁶⁶

Since terrorism is a worldwide phenomenon arising from ancient personal, ethnic, and political stresses throughout the world, rooting it out has to be carried out on a global scale. Maharishi’s urgent proposal is to form a group of 40,000 Vedic pundits in India as peace-keeping professionals. They would practice the TM and TM-Sidhi programs as well as other Vedic peace-generating technologies all day every day. Evaluation of the effects of this group would use independent data sources of terrorism (such as the Rand corporation data bank), intelligence from various governmental agencies, economic indicators, etc. to see if the group of 40,000 produces a significant improvement that could not have been predicted from the previous history of the various series under study (see www.permanentpeace.com).

I ask you join us in this. We are faced with the prospect of an endless chain of destruction, back and forth. Political negotiations don’t work. Since the United Nations was formed in 1945 there have been 145 major wars. Since 1000 BC, there have been 8,000 peace treaties, which have lasted on an average of no more than nine years. Let us try something new. “Only a new seed will yield a new crop.” What greater research project could there be than to try to create world peace.

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