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Consciousness as a Field: The Transcendental Meditation and TM-Sidhi Program and Changes in Social Indicators

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A series of studies was performed to assess the prediction of a "field effect" of improved quality of life in society associated with participation in a mental practice, the Transcendental Meditation (TM) and TM-Sidhi program, by a sufficient fraction of the population. Five studies used a direct intervention design with Box-Jenkins time series analysis methodology to assess the effect of introducing sufficient-sized groups of participants in the TM-Sidhi program into social systems at the territorial, state or regional/national level. These studies indicated reduced crime totals in the Union Territory of Delhi, in Puerto Rico, and in Metro Manila, Philippines, coincident with the introduction of the groups; additional studies in the Philippines and the state of Rhode Island in the U.S. generalize these findings to more comprehensive indices of quality of life. Results were consistent with predictions and suggest a new mechanism of social change with theoretical implications concerning the nature of consciousness and also with potential practical application.

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From time to time within the progress of a scientific discipline, there arises the opportunity for empirical research to suggest conclusions that could not be anticipated by the common assumptions of everyday experience. On such occasions, the opportunity arises for a theoretical perspective, predicting unique empirical observations, to suggest a profound and possibly surprising glimpse into the structure of nature. Over the past ten years, a number of researchers, including us, have been gathering mounting evidence on a phenomenon that we feel provides such a glimpse.

The research presented here provides evidence for a deeper level of connection between individuals in society than has previously been considered possible; moreover, in doing so it suggests a practical approach for improving the quality of life in society. The central finding of our studies is that a very small fraction of the members of a society, participating in a mental practice for the development of consciousness (Maharishi Mahesh Yogi, 1977), results in a measurable improvement in the quality of life in the entire society. This effect, which does not seem to be dependent on direct interaction with the larger population, suggests the necessity for a new mechanism of social change; the mechanism proposed here is a field effect on the level of consciousness itself.

The theoretical premises that have generated the research, although unique to contemporary thought in psychology and the social sciences, have their historical roots in the oldest records of antiquity, and also have similar precedents in the ideas of the founding figures of psychology and sociology. At the same time, these premises are consistent with the most recent and fundamental advances of the physical sciences.

The question of the most basic level of connection between individuals could be approached from a number of perspectives. In the physical sciences, the question becomes the search for the most basic connection between the diverse forces of nature, including the electromagnetic force most directly responsible for the laws governing chemical and biological systems. The search for a "unified field" has made dramatic progress in the past decade, resulting in the recent development (Schwarzshild, 1985; Waldrop, 1985) of fully consistent unified field theories that, in unifying all force and matter fields, describe a common source and interconnection of everything in nature, including all individuals.

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From the perspective of the discipline of psychology, however, the question becomes, what is the most fundamental level of interconnection that has significance for influencing human behavior, or to which the individual can gain conscious access? In contrast to the description by physics of the fundamental fields of nature, scientific psychology has historically viewed the connection between individuals as localized or, in a broad sense, behavioral. That is, the role of consciousness and cognitive and affective processes, as well as that of past experiences and environmental influences, have all been appreciated as factors influencing human interaction; however, lacking reliable evidence to the contrary, it has naturally been assumed that connection between individuals is dependent upon direct interaction, like classical particles in physics.

Given the current understanding of nature provided by the physical sciences, it may be questioned whether all connection between individuals that is of significance for human experience is isolated from the field character of nature at more fundamental levels. In this context one is struck by the relevance of the earliest recorded statement about the nature of human consciousness, that of the Vedic tradition of India, in which the existence of a single unified field of nature is asserted; this field is identified as the deepest level of human consciousness (Maharishi Mahesh Yogi, 1985). On the basis of this identification it is stated that the unified field is subject to direct human experience, and that this experience is of behavioral relevance to the individual and society.

The introduction to this paper first addresses the historical source of the suggestion of a field of consciousness, and notes antecedents in the history of the fields of psychology and sociology. The theoretical basis of the present studies then follows, with the results of a series of studies conducted over the past seven years.

Historical Sources of Consciousness as a Field

The most ancient source of the description of a unified field, identified with consciousness, is in the Vedic tradition of India, the oldest continuous tradition of knowledge (Basham, 1959, p. 4); this tradition contains a body of subjective procedures intended to allow the individual to experience the unified source of nature in the most fundamental level of human consciousness (Maharishi Mahesh Yogi, 1969). From the perspective of the Vedic tradition ("Veda" means *knowledge* in Sanskrit), consciousness is not an emergent property of matter that comes into existence through the functioning of the human nervous system, but is the very content of the most basic level of nature, a field that gives rise to and pervades all manifest phenomena (*Bhagavad-Gita*, 1897/1977; Maharishi Mahesh Yogi, 1969; *Principal Upanishads*,

1974; Sankaracharya, 1977). The quality of consciousness that is said to characterize the unified field is "pure consciousness," not consciousness qualified by an object or individual experience, but consciousness as an unbounded field; from this viewpoint, the crucial role of the human nervous system is to provide a material structure of sufficient integrated complexity to reflect, qualify, or individualize consciousness, providing the potential for individual experience (Maharishi Mahesh Yogi, 1977, p. 6).

The Vedic tradition adds that it is possible for the individual to experience the field of pure consciousness, the essential nature of consciousness. According to Vedic psychology, for this to occur, one's consciousness must be allowed to experience its "self-referral" state, in which consciousness is awake only to itself (pure consciousness), rather than identified with the objects of perception, thought, or feeling; in this state, knower, process of knowing, and known are said to be unified (Maharishi Mahesh Yogi, 1985, pp. 64–66). A systematic refinement of the functioning of mind and body is said to be necessary for this to take place, and a set of procedures are described by the Vedic texts for such refinement (Maharishi Mahesh Yogi, 1969; Patanjali, 1912/1978).

Although this perspective has inspired a number of thinkers within psychology and philosophy, its empirical consequences have lain dormant for lack of availability of the experimental or experiential procedures said to be critical to validating the theoretical principles. Within the past thirty years, however, Maharishi Mahesh Yogi has acted as a major modern exponent of Vedic knowledge; he has made available the experiential or empirical basis of this knowledge through a simple mental technology taught to over three million people around the world and he has stimulated scientific research on its effects (Chalmers, Clements, Schenkluhn, and Weinless, in press; Orme-Johnson and Farrow, 1977). He has also expressed the theoretical basis of Vedic knowledge in terms that are accessible and empirically testable, and he has encouraged discussion with leading figures in the natural sciences about the relationship of Vedic knowledge to the most recent advances of these disciplines.

The theoretical premise of a "field" of consciousness is found partially expressed in the work of some of the founders of psychology and sociology, particularly James, Fechner (both cited in James, 1898/1977) and Durkheim (e.g., Durkheim, 1951). Each attempted to express the possibility that there might be some interconnection between individuals that is fundamentally related to the nature of consciousness. None, however, suggested that this unifying element of consciousness might have any relationship to the foundational level of objective existence. This is to be expected, since at the time of their work an entirely different, classical picture of nature prevailed in the physical sciences, which had naturally influenced the dominant thinkers of

the period (Heisenberg, 1958, pp. 187–206).

Gustav Fechner raised the question of what would be the circumstances in which there would be a continuity of consciousness: "Whence comes it that different organisms have separate consciousnesses, although their bodies are just as much connected by general Nature as the parts of a single organism are with each other, and these latter give a single conscious resultant? . . . And does not Nature as a whole show as strict a connection as any organism does,—yea, one even more indissoluble? And the same question comes up within each organism." Fechner noted, "One of the most important problems and tasks of Psycho-physics now is this: to determine the conditions under which the cases of continuity and of discontinuity occur" (James, 1898/1977, pp. 60–61). Fechner proposed that the experience of discontinuity of consciousness is due to the lack of sensitivity of the psychophysical "threshold" necessary for experience. He likened the "physical solidarity of all these psychophysical systems throughout Nature" to a single ocean on which rise distinct waves; the crest of a wave rising above a certain threshold results in a unity of consciousness of a single wave, and the isolation of that wave is the expression of the fact that the valley separating it from another wave is below the psychophysical threshold (James, 1898/1977, pp. 63–64). Fechner concluded, "If, in the diagram, we should raise the entire line of waves so that not only the crests but the valleys appeared above the threshold, then these latter would appear only as depressions in one great continuous wave above the threshold, and the discontinuity of the consciousness would be converted into continuity. We of course cannot bring this about." (James, 1898/1977, p. 65). William James himself raises Fechner's scheme in an essay in which he discusses the plausibility of the proposal that consciousness is fundamentally universal in character.

Fechner's legacy of the experimental psychophysical method has continued to the present day; nevertheless, his theoretical suggestion about the possibility of a unified level of consciousness is almost entirely forgotten, since his psychophysical method could not directly test his proposal. Like the Vedic theory, Fechner proposed that the possibility of a unified level of consciousness could be realized only by changing the fundamental "psycho-physical" conditions of experience; however, Fechner had no suggestions for a method to alter these conditions.

Emile Durkheim, the French social thinker who is considered the founder of sociology as a scientific discipline, proposed that the essence of the social fabric uniting individuals in society was a *conscience collective* (translated as either "collective conscience" or "collective consciousness"). Durkheim defined *conscience collective* as "the set of beliefs and sentiments common to the average members of a single society [which] forms a determinate system that has its own life" (Lukes, 1973, p. 4). The *conscience collective* was considered by

Durkheim as the psychical or mental level of society, arising when "the consciousness of individuals, instead of remaining isolated, becomes grouped and combined," resulting in a new whole consisting of social "representations" or "states of mind" that "are qualitatively different from individual ones," and "are in a sense exterior to individuals" (Durkheim, 1951, pp. 310, 312, 313). Durkheim viewed these "collective states" or "collective tendencies" as forces which have their substratum not in the individual consciousness but in the interaction of individuals, as individual conscious states were the result of association of elements of a lower order, and so on to inanimate particles; these forces or "currents" which are largely diffuse, but which also may be "crystallized" into social institutions and objective features of society, "affect the individual from without" like physical forces, "though through other channels" (Durkheim, 1951, pp. 309, 312, 313–315, 319–320). Durkheim viewed as empirical evidence for his concept the stability of the totals of categories of individual behaviors such as suicides in a given society. Such proposed forms of evidence have not been sufficiently strong for his concept to remain in the mainstream of sociological thought.

The Vedic description of consciousness as a unified field differs from Durkheim's notion of *conscience collective* in several fundamental respects. Durkheim focused on "currents," "representations," or "states of mind" in society, and did not envision the possibility of a more fundamental experience of consciousness as a unified "pure consciousness" independent of representational states or objects of experience. He presumed an atomistic conception of nature from an earlier physics, lacking either the concept of a field or the theme of unification in nature, even though the unified electromagnetic field, the first step in the modern program of unification in physics, had already been demonstrated by Maxwell. He viewed consciousness as an emergent property of the interaction of more fundamental elements, and viewed the *conscience collective* in the same way, in contrast to the Vedic perspective on consciousness as the fundamental character of the unified field. Finally, Durkheim proposed that the *conscience collective* was external to the individual consciousness; the medium through which "social currents" propagate was not clarified. Vedic theory holds in contrast that the unified field, pure consciousness, is the essential nature and basis of each individual consciousness as well as the consciousness of society considered collectively.

It will be useful to briefly examine the tenability of the Vedic perspective of the unified field as a field of consciousness in light of the recent advances of unified quantum field theories. The progress of the unification program of physics has been ensured by the fact that at more minute scales of time and distance, the diversity of natural phenomena becomes increasingly simplified. This simplicity is reflected in the group symmetries that unite the mathematical representation of matter and force fields (Freedman and

Nieuwenhuizen, 1978; Schwarzschild, 1985). Within the past twenty-five years, there has been a sequential unification of the four fundamental forces of nature (the long-range forces of electromagnetism and gravity and the weak and strong interactions within the nucleus), leading to the recent discovery of supersymmetry (Freedman and Nieuwenhuizen, 1985; Schwarzschild, 1985). Supersymmetry, a symmetry that unites all four forces and at the same time unites force (Bose) and matter (Fermi) fields into one unified field of nature, is the common element of all variations of unified quantum field theories, including the most recent advances in "closed-string" superstring theory that resolve previous problems with unified field theories (Schwarzschild, 1985; Waldrop, 1985).

The Vedic description of the unified field of consciousness, as elaborated by Maharishi, is quite similar in its fundamental features to the current description of the unified field by physicists. According to the Vedic literature, the unified field is all-pervading and yet beyond space and time (Maharishi Mahesh Yogi, 1969, p. 339; 1977, p. 6). In supersymmetric theories, superunification is located at any point at the "Planck scale" of 10^{-33} cm or 10^{-43} sec, a scale at which the structure of space-time assumes a quantum rather than continuous geometry, by virtue of which the concepts of distance and sequence become ill-defined (Ellis, 1983; Schwarzschild, 1985). In the Vedic literature the unified field (pure consciousness) is described as having an internal dynamics of self-referral, which gives rise to the specific laws of nature responsible for manifest existence (Maharishi Mahesh Yogi, 1985, pp. 64–69). Similarly, at the Planck scale of superunification, the unified state of nature is described as possessing an immense internal dynamism, due to the relationship between frequency (smaller time and distance) and energy, and through its dynamics of self-interaction, it gives rise to all expressed phenomena and all the laws of nature that govern their interactions (Freedman and Nieuwenhuizen, 1978; Schwarzschild, 1985). The Vedic literature describes the unified field as a field of pure intelligence in nature, and physics describes it as a field in which all the laws of nature, all principles of orderly change, are intrinsic.

The Vedic attribute of the unified field that is not currently found in the perspective of physical theory is that of "pure consciousness." It is clear that consciousness as we ordinarily experience it in our waking awareness does not reflect the unified structure of the laws of nature, just as the objects around us do not express the unified structure of nature on the scale of nature at which our senses operate. On this the Vedic theory explicitly agrees. However, on the level of the unified field, the distinction between object and subject is necessarily transcended; this field is the unified source of the knower as well as all objects of knowledge. As the source of all properties in nature, consciousness, as such a property, must be intrinsic to the unified field in

some way. What the Vedic tradition asserts is that consciousness is intrinsic to the unified field in its most fundamental or pure state where knower, process of knowing, and known are united; consciousness in this sense is an abstract field of self-referral dynamism, a lively potentiality (Maharishi Mahesh Yogi, 1986, pp. 29–33). The features of the objective description of physics that are closest to this Vedic description are the identification of the unified field as an unbounded field that is not inert, but rather has its own internal and virtually "infinite" dynamism of self-referral or self-interaction.

The suggestion that consciousness is directly related to the most basic descriptions of nature has been proposed repeatedly in twentieth-century physics (e.g. d'Espagnat, 1979; Eddington, 1929; Jeans, 1930; Schroedinger, 1967), including the recent suggestion, by a unified field theorist, of the Vedic perspective that consciousness at its most fundamental level may be the nature of the unified field (Hagelin, 1987).

What is further asserted by Vedic psychology is that because the unified field is the unified source of both objective and subjective existence, there is a continuity or connectedness between the unified field and expressed or bounded states of consciousness, just as there is a continuity or connectedness between the unified field and the expressed or bound states of matter. Thus, just as the unified field has been located through purely objective means by probing finer time and distance scales within the structure of matter, the Vedic theory states that it is possible to locate the unified field by an entirely subjective approach that, on an experiential level, allows a bound state of consciousness, the waking awareness of an individual, to sequentially experience "subtler levels" of mental activity leading to the experience of the unified level of pure consciousness (Maharishi Mahesh Yogi, 1969, pp. 470–472; 1985, p. 60). In Maharishi Mahesh Yogi's revival of Vedic science, the subjective technology of consciousness to fulfill this purpose is termed the *Maharishi Technology of the Unified Field*, and includes the *Transcendental Meditation* (TM) technique and the advanced practice of the *TM-Sidhi* program (Maharishi Mahesh Yogi, 1985, p. 60).

Testing the Description of Consciousness as a Field

The challenge of a theory as broad as the Vedic theory of consciousness is to translate it into testable consequences that are tied to the key theoretical concepts. It is beyond the scope of the present paper to outline in great detail Maharishi's formulation of the Vedic description of consciousness and its relation both to human behavior and to nature. However, two basic elements of the Vedic description of the unified field as the field of pure consciousness, each of which have relevance to its testability in the present context, can be mentioned. The first is the concept of consciousness as directly connected

with the objective structure of natural law, and therefore fundamental to the quality of an individual's behavior and interaction with the environment; when the deeper levels of human awareness are systematically experienced, a breadth of awareness is predicted to develop in which behavior is both more effective and in greater harmony with the needs of the environment. This is consistent, in the extreme case, with the results of studies indicating that maximum-security inmates who begin the TM program while incarcerated show significantly lower rates of recidivism over subsequent years than either matched controls or inmates participating in other programs (Alexander, 1982; Bleick and Abrams, in press).

The second key element of the Vedic description of consciousness is that consciousness is fundamentally unified and therefore a field common to all individuals. It is proposed that the quality of behavior at each level of society—family, community, city, state, nation, or the world as a whole—is governed by the quality of the "collective consciousness" of the society (Maharishi Mahesh Yogi, 1977, pp. 122–127). The quality of collective consciousness of the society is seen as the integrated expression of the consciousness of each individual in the society (Maharishi Mahesh Yogi, 1977, p. 122), just as the quality of individual consciousness is the integrated expression of the activity of the various physiological components. A reciprocal relationship between individual and collective consciousness is described, in which individual consciousness not only influences, but is in turn influenced by, the collective consciousness of the various levels of the society of which it is a part (Maharishi Mahesh Yogi, 1977, pp. 123–127). The most fundamental level of collective consciousness is described as the same as the most basic level of individual consciousness, the field of pure consciousness, the unified field (Maharishi Mahesh Yogi, 1985, pp. 56–76).

The essential characteristic of collective consciousness that is said to influence the quality of behavior in society is what might be termed the "coherence" of collective consciousness (Maharishi Mahesh Yogi, 1978, pp. 123–129). The coherence of collective consciousness, according to Maharishi, is a function of the breadth of comprehension of consciousness of individuals in society, as previously described, and therefore the degree to which their behavior is constructive in its influence. It is predicted that increasing coherence of collective consciousness is expressed in greater integration between individual needs and the needs of the society as a whole (Maharishi Mahesh Yogi, 1978, pp. 146–156). Conversely, lack of coherence is reflected in conflict between individual desires or behavior and the orderly functioning of society. Crime, social turbulence, and other expressions of lack of harmony in society are seen as expressions of stress or lack of coherence in the collective consciousness of society.

Maharishi's description of collective consciousness seems at first quite similar

to Durkheim's description of *conscience collective*. However, there are fundamental differences, some of which were previously noted. In addition to these, a further difference is Maharishi's description of the possibility of higher levels of individual and collective consciousness and behavior, in which individual and collective interests are integrated; in contrast, Durkheim felt that the two were inevitably in conflict (Durkheim, 1961a, pp. 872–875; 1961b, pp. 720–724).

The field nature of pure consciousness as the basis of both individual and collective consciousness, and the relationship between consciousness and behavior, are taken by Maharishi as the basis of testable predictions and a practical program for improving the quality of life in society that are unique in the history of psychology or sociology. Although it is quite difficult to improve the quality of social behavior by either trying to influence large numbers of people individually or else trying to make structural changes in society, Maharishi asserts that it is possible to increase the quality of collective consciousness and behavior of society directly through a field effect on the level of consciousness (Maharishi Mahesh Yogi, 1978, pp. 191–202). If consciousness is indeed a field, then the type of behavior characteristic of a field in physics—effects apparently propagated at a distance (Sudarshan and Mukunda, 1974, pp. 564–566)—should also be evident in social systems if the field of pure consciousness is actually influenced.[1]

The proposed principle for creating the field effect in society is that if a sufficient influence is created by individuals regularly and systematically experiencing the field of pure consciousness, then not only will their individual behavior be characterized by greater effectiveness and a more progressive quality, but if their influence is of sufficient magnitude by virtue of their numbers, then the entire social system of which they are a part will display an improved quality of life as characterized by decreased negative trends and increased integration between individual desires and the social good (Maharishi Mahesh Yogi, 1977, pp. 8–10). The most dramatic feature of this principle is that the numbers said to be required for this effect are sufficiently small that in terms of theoretical implications a field effect would be clearly indicated, and on a practical level it would be feasible to effectively implement programs utilizing the principle.

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[1]Another proposal of fields influencing behavior is the hypothesis of morphogenetic and motor fields; these fields are proposed as mediating the development of form and behavior on a species-wide basis, and it is hypothesized that through the influence of such fields the likelihood of *specific* forms of behaviors recurring throughout the species increases as a result of the frequency of their past occurrence (Sheldrake, 1981). In contrast, collective consciousness is proposed as governing the quality of human behavior *in general*; the field of pure consciousness, at the basis of both individual and collective consciousness, is proposed as the unified field underlying all mental activity and physical processes (Hagelin, 1987; Maharishi Mahesh Yogi, 1986).

As early as 1960, Maharishi proposed that the number of individuals experiencing the field of pure consciousness through the Transcendental Meditation technique necessary to result in more positive behavior in society was as few as one per cent of a city's population; this phenomenon was named the "Maharishi Effect" in the first study that investigated it many years later (Borland and Landrith, 1977). This effect is predicted to be associated with a holistic improvement in the quality of life, such as decreased crime, accidents, and turbulence, and increased physical and mental health and economic vitality (Maharishi Mahesh Yogi, 1977, pp. 8–10). The advanced TM-Sidhi program, which is designed to more quickly stabilize the experience of pure consciousness as a permanent feature of the individual's experience, is predicted to have an effect of creating an even stronger positive influence in society. Maharishi proposed that as few as the square root of one per cent of a society's population participating in the TM-Sidhi program together in one group will create a measurable influence of improvement in the quality of life of society (Maharishi European Research University, 1979, p. 160).[2] Because the smaller required proportion of participants in the group practice of the TM-Sidhi program allows effects to be implemented on larger scales of society, this phenomenon has been termed the extended Maharishi Effect on the state or national levels, or the global Maharishi Effect on the scale of the world as a single system (Maharishi European Research University, 1984, pp. 217–223).

The first study of the Maharishi Effect measured crime rate change in the 11 U.S. cities larger than 25,000 population that were not part of a larger metropolitan area and in which one per cent of the population had been instructed in the TM program by 1972. In contrast to cities matched for geographic region, population, college population, and prior crime rate, the "one per cent" cities decreased in crime rate in 1973; the rate of increase of crime rate found in the control cities was also found to be comparable to all cities in the U.S. of their size in 1973 (Borland and Landrith, 1977). A similar study was subsequently performed that included not only the prior cities but also all cities between 10,000 and 25,000 population that met the same criteria as in the first study and were compared to control cities matched according to the same criteria as in that study; the matching was performed by an independent researcher prior to data collection (Dillbeck, Landrith, and Orme-Johnson, 1981). Significantly reduced crime rate in 1973 was found also in this sample of "one per cent" cities, as well as decreased trend of crime

[2]The square root figure was proposed in discussions with physicists upon analysis of physical systems in which the number of coherently interacting elements creates an overall influence proportion to their square, in contrast to incoherent elements, the influence of which is proportional to their number; the one per cent is an empirical constant suggested by the prior research on the Maharishi Effect.

rate from 1972 to 1977, where trend was defined as the least-squares slope of crime rates over those years; statistical analysis also involved covarying for demographic variables correlated with crime rate on which the cities differed.

Significant negative correlations have also been found between percentage instructed in the Transcendental Meditation program and crime rate change within the cities of single metropolitan areas in the U.S., such as the Cleveland area for the years 1974 to 1976 (Hatchard, in press), the Kansas City area in 1975 and 1976 (Dillbeck, in press), and the Chicago area in 1976 and 1977 (Patterson, 1981). These are years in which a large number of individuals were instructed in the TM program in the U.S. The study in the Kansas City metropolitan area used partial correlation to eliminate as alternative hypotheses ten other demographic and economic variables related by previous research to level or change of crime rate. Subsequent studies, using the method of cross-lagged panel correlation to analyze patterns of relationships between TM program participation and crime rate change from the years 1972 to 1979 among random samples of U.S. cities and metropolitan areas, have offered consistent evidence that there is no unmeasured causal variable responsible for this relationship and also give evidence that TM program participation is the causal influence in the relationship (Dillbeck, Landrith, Polanzi, and Baker, in press).

Since these initial studies on the Maharishi Effect at the city level, a large number of replications with more sophisticated research designs have been carried out over a period of eight years. In particular, the very small number of participants predicted to be necessary to create the extended Maharishi Effect has allowed for experimental intervention studies to be carried out at the state, national and even international levels. For example, a group of Dutch investigators reported that on the three one-month periods in which there were large courses involving the group practice of the TM-Sidhi program by more than the square root of one per cent of the population of Holland, crime rate decreased significantly in contrast to the same months of the prior eleven years (Burgmans, Burgt, Lagenkamp, and Verstegen, in press). In the District of Columbia in the U.S., a time series study found that on the repeated occasions in which there were large numbers of participants on courses involving the group practice of the TM-Sidhi program between August of 1980 and November of 1983, there was a significant decline in weekly homicides in the District (Lanford, in press).[3]

[3]It might be argued that participation in the TM and TM-Sidhi program could serve to remove individuals from the likelihood of being victims (or even perpetrators) of crime. However, it is extremely unlikely that the observed effects could be explained by this mechanism. Participants in the program are reported to be a representative sample of the population from all walks of life; moreover, the effect requires only one percent of the population participating in the TM

On the basis of the many replications that we have carried out in recent years, we now feel quite confident that a reliable empirical phenomenon is being assessed. The present paper is the first in a series of major reports on the phenomenon of the Maharishi Effect and its extension to national or international social systems, and other findings to be presented in future papers will be briefly noted in the General Discussion. The series of studies reported here includes studies on the territorial, state, or regional/national levels; it focuses primarily on crime rate changes associated with the practice of the Transcendental Meditation and TM-Sidhi program, although the last two studies generalize to broader indices of quality of life. The studies use time series intervention analysis to assess the effects on social parameters of the creation of sufficient-sized groups of participants in the TM-Sidhi program. The studies are presented in an order suggested by their experimental design, according to increasing complexity of design or scope of measurement.

Study 1

Method

Sample. A Vedic science course in New Delhi, India began on November 6, 1980, with approximately three thousand participants in the Transcendental Meditation and TM-Sidhi program present for the first month. A large group left at the end of the first month, and the number gradually decreased until it reached approximately two hundred and fifty when the course ended in early April. Since the population of the Union Territory of Delhi was then six million, a group of two hundred and forty-five (the square root of one percent) would theoretically be the minimum number necessary to influence the entire capital territory. Thus, an effect on the crime totals in the territory of Delhi could be predicted throughout the period of the Vedic science course.

Measures. Daily crime totals for the Union Territory of Delhi were obtained

technique for only twenty minutes twice daily, and since participants continue with their jobs and recreational activities as before, they would not be removing themselves from social interaction. In the case of residential courses involving the TM-Sidhi program, although subjects remove themselves from the likelihood of violent crime by leaving home they also increase the opportunity for victimization by property crimes; however, such local mechanisms seem unlikely to be a major factor in these studies, since the required number in this case is even much smaller, the square root of one percent, while the observed effects on social statistics are several orders of magnitude greater. In addition, in many studies involving temporary courses of TM-Sidhi program participants, the participants have come from outside the geographical area of study and thus represent only an increase in the population for which the social statistics are measured. In all cases, in the studies reported in the present paper, the size of the geographical or demographic area assessed for influence is determined as the largest statistical/demographic unit for which the number of TM-Sidhi participants is in excess of the square root of one percent of the population.

from the Delhi Police Headquarters for the months June 1980 through March 1981, a series comprising 304 observations. Crime totals were those reported according to the Indian Penal Code (IPC), consisting of the following categories: murder, attempted murder, robbery, riot, dacoity (violent crimes committed by roving bands), burglary, snatching, injury, motor vehicle theft, cycle theft, miscellaneous theft, and miscellaneous IPC crimes (e.g. non-grievous injury). Daily totals rather than rates served as the dependent (endogenous) variable because changes in population were not available on a daily basis.

Procedure. The period June 1, 1980 to November 5, 1980 (158 observations) served as the preintervention or baseline period, and the intervention period was November 6, 1980 to March 31, 1981 (146 observations). There was not a clear theoretical prediction as to whether the influence of coherence over the predicted threshold during the early part of the intervention period, when the number of TM-Sidhi participants was greater, would be of uniform intensity but spread over a larger region, or would be of greater magnitude locally. Therefore, because the numbers were over the predicted threshold throughout the intervention period, the intervention period was modeled as a single homogeneous intervention rather than as an intervention decreasing by some function.

Data analysis. Time series analysis procedures were used in this and subsequent studies to assess the effects of experimental interventions. Time series procedures are the most rigorous approach available for testing interventions in a single system. Usual parametric statistical tests assume that observations are independent and normally distributed. The independence assumption is usually violated in the case of time-dependent observations of a system. Although most parametric procedures are robust with respect to violations of normality, the presence of autocorrelations (serial correlation of a series with itself at various time lags) can lead to spuriously high test statistics (Box and Jenkins, 1976; Box and Tiao, 1975). Time series procedures, such as the standard autoregressive integrated moving averages (ARIMA or Box-Jenkins) approach used here, model the serial dependence of the data; the residuals from this "noise" model, the model that best describes the series without considering the intervention, should be a series of random disturbances around a constant value.

The first step in analysis is the construction of an ARIMA noise model for the series from the preintervention time series, or the whole time series if the series is short, on the basis of the autocorrelation and partial autocorrelation structure of the series. The next step is the joint estimation of one or more intervention parameters and the noise model for the full data time series. The noise component thus serves as the null case in the intervention analysis. Diagnostic tests of the residuals of the model determine at each step

whether the structure of the residuals differs significantly from a series of independent random disturbances (Ljung and Box, 1978).

The intervention assessment model tested here is the "zero order" transfer function model $Y_t = \omega_0 I_t + N_t$, where Y_t is the observed time series (crime totals), I_t is an intervention step function which is one during the intervention and zero elsewhere, ω_0 is the intervention parameter to be estimated, and N_t is a stochastic "noise component" to be described by ARIMA models (Box and Tiao, 1975; McCleary and Hay, 1980; Tiao, Box, and Hamming, 1975).

Results

The model for N_t was somewhat complex. It included an autoregressive parameter of the first and second order as well as seventh order (weekly seasonality). In addition, an apparent monthly (31-day) seasonality was also found, which was modeled by a multiplicative first order autoregressive seasonal component. Thus, the model identified in this case for N_t was $N_t = (1-\phi_1 B^1 - \phi_2 B^2 - \phi_3 B^7)^{-1}(1-\phi_4 B^{31})^{-1} a_t + c$, where $B^n Y_t = Y_{t-n}$, ϕ_i are autoregressive parameters, a_t denotes a series of independent and identically distributed random disturbances, and c is a constant.

Diagnostic tests of the residuals for the model were satisfactory. The residual autocorrelations are consistent with the null hypothesis of a serially independent "white noise" disturbance term with only one of 60 autocorrelations (up to lag 60) significant at the .05 level, $r_{30} = .132$, $z = 2.04$, $p = .02$; this number would be expected by chance at the .05 significance level. Similarly, the Ljung-Box test for the joint significance of observed residual autocorrelations (Ljung and Box, 1978) yields the Q statistic 26.1 for autocorrelations one through 36; this is distributed approximately as χ^2 with 32 degrees of freedom, $p > .75$. The corresponding Q statistic for autocorrelations one through 60 is $Q = 46.3$, 56 degrees of freedom, $p > .75$. Thus, the null hypothesis of white noise random disturbances cannot be rejected.

The parameter estimates and their corresponding t-statistic values are listed in Table 1. The intervention parameter was -14.647, $t(260) = -5.12$, $p < .0001$. This means that there were on the average 14.65 reported crimes per day less during the intervention period than during the preintervention period. This represents a reduction of 11.0 percent from the preintervention average of 136.34 reported crimes per day. The size and statistical significance of the intervention parameter proved to be highly robust to alternative specifications of the noise model.

Discussion

A highly significant decrease in crime totals was found in the Union Territory of Delhi during the five-month period of the Vedic science course.

Table 1

Intervention Analysis Parameters for Daily Crime Totals in the Union Territory of Delhi

Parameter	*Estimate*	*t(260)*
Intervention	−14.647	−5.12*
One Day Autoregressive	0.156	2.53‡
Two Day Autoregressive	0.090	1.47
Seven Day Autoregressive	0.160	2.66‡
Thirty-one Day Autoregressive	−0.141	−2.29†
Constant (Mean)	137.385	65.46‡‡

*$p<.0001$, one-tailed. †$p<.05$, two-tailed. ‡$p<..01$, two-tailed. ‡‡$p<.0001$, two-tailed.

With the time series intervention analysis used, this decrease cannot be accounted for by factors inherent in the structure of the daily series of crime data prior to the course.

Another category of alternative hypothesis is that the decrease found might have been due to a change in police procedures or a longer-term seasonality. For example, changes in governmental policies of detention of habitual criminals, associated with the change in national administrators, was reported by police to affect the monthly totals of IPC crimes in Delhi, as elsewhere in India. Such changes occurred at the transitions of national leadership from Prime Minister Gandhi to Prime Minister Desai and back, in April 1977 and in early 1980. However, these changes had stabilized by the beginning of this study.

A detailed examination of possible confounding influences due to police procedures was made by an Indian police official in the context of a preliminary examination of crime changes associated with the Vedic science course in New Delhi (Rana, 1981). He found that there were no changes in local police policy, no special "drives" on crime, no systematic transfer of police staff, and no apparent changes in the number of criminals through externment or court clearance. Rana also found no seasonal variations due to time of year in previous years which would be associated with the beginning of the Vedic science course. Consistent with this, in examining monthly totals we found that in spite of the changes associated with governmental administrations, the monthly means for the periods July to October and November to January, averaged over the years 1976 to January 1980, differed by less than one percent.

Rana (1981) notes that the only possible confounding factor during this period was the passage of a National Security Ordinance which took effect beginning in October 1980, allowing the detainment of habitual criminals

under some circumstances. Unlike the changes in detention procedure reported above, this act was not associated with a change in the national administration; however, it does not account for the magnitude of change found in this study. Rana's analysis of the number of criminals actually detained in Delhi during this period indicated that at most one-third of the decrease found here could reasonably be attributed to the detainment of criminals. Moreover, the newspaper reports indicate that slightly less than half of the detainments mentioned by Rana (1981) were still in effect several months later, indicating that the effect of the National Security Ordinance over the whole intervention period is probably not as strong as the one-third estimate. He also notes that at the end of the Vedic science course in April, heinous crimes in Delhi returned to their former level, even though the National Security Ordinance was still in effect. Heinous crimes are a subcategory of IPC crimes; this category consists of violent crimes and includes dacoity, which is primarily an offense involving habitual criminals. It was not possible to obtain post-intervention daily IPC crime totals from the Delhi police.

The next study assesses changes in crime totals both before and after the presence of a large group of participants in the TM-Sidhi program, at the territorial level, using time series analysis.

Study 2

Method

Sample. Large courses involving the group practice of the Transcendental Meditation and TM-Sidhi program began on a permanent basis in late December 1981 in Fajardo, Puerto Rico, a small town approximately 68 miles from metropolitan San Juan, with the establishment of a facility for such courses. Courses were held during each subsequent month over the next ten months, with varying numbers. In November 1982, a longer-term group of course participants arrived; this group brought the total number of Transcendental Meditation and TM-Sidhi program participants, including staff and those on shorter courses, to numbers consistently over 100 persons. Approximately 185 participants (the square root of one percent of the nearly 3.4 million population of Puerto Rico) are theoretically predicted to be required to create the extended Maharishi Effect for Puerto Rico.

Because only monthly data were available, this study adopted a criterion of reaching the required number for at least two weeks of the month. This criterion was reached for the first and only time in April of 1984, when in addition to the more stable group there was a large special course in the last two weeks of April. In May and June of 1984 the size of the group fluctuated quite close to the required number, between 60% and 80% of that total. Then,

at the end of June 1984, the long-term group left Puerto Rico for another location, offering the additional opportunity to test the influence of the departure of the group practicing the technology in Puerto Rico.

Measures. Monthly crime totals for Puerto Rico as a whole were provided by the Puerto Rico Police Department for January 1969 to September 1984, with 189 data points available at the time of the study. The crime figures included the total "Type 1" crimes, which is the same as the U.S. FBI Uniform Crime Index total before 1979, including homicide, forcible rape, aggravated assault, robbery, burglary, larceny, and motor vehicle theft (U.S. Department of Justice, 1978). Monthly totals were not adjusted for population changes because only ten-year census figures were available.

Procedure and data analysis. The baseline (preintervention period) used to diagnose the noise model for the time series was from January 1968 to March 1984 (183 observations). The two major events whose effects were to be tested were the attainment of the required number of participants in the group practice of the TM-Sidhi program in April 1984, and their departure at the end of June 1984. Because each of these events involved the same mechanism, and because each comprised only a single monthly data point in a time series of 189 points, these two events were combined into a single intervention parameter. This increased the statistical power of the intervention analysis and tested the joint probability of changes associated with the two events. The intervention (exogenous) series had a value of one in April, negative one in July, and zero elsewhere, as appropriate for an endogenous series that would be differenced at lag one (see below). As in the previous study, the intervention model was the "zero-order" transfer function (McCleary and Hay, 1980).

There was some fluctuation in the numbers before April 1984; however, because the extended Maharishi Effect is predicted to require a threshold number these fluctuations were ignored. At the same time, although the group was not quite at the required level at the time the long-term group left at the end of June, the departure was still considered to be a major event because: (1) the numbers had been maintained between 60% and 80% of the required amount since the end of April and thus some continuing effect of the large group might be expected, and (2) the departure at the end of June constituted virtually the entirety of the group of experts who had been participating in the group practice of the technology in Puerto Rico.

Results

In modeling the present series, the data had to be differenced at a one-month lag in order for the series to be stationary around its mean. In addition, the model for N_t required autoregressive parameters of the first order,

twelfth order (yearly seasonality), and twenty-fourth order (biannual seasonality). The noise model was thus $N_t=(1-\phi_1B^1-\phi_2B^{12}-\phi_3B^{24})^{-1}(1-B)^{-1}a_t$, where terms are as previously defined and where (1−B) denotes differencing of the raw data. This model was able to transform the raw series into a series of random disturbances around a constant value, removing the autocorrelation structure from the data.

The full data set (189 observations) was next employed to jointly estimate the intervention component (ω_0) and the autoregressive parameters of the noise model (N_t). The fit of the model was appropriate, as indicated by the significance of the noise model parameters and as indicated by the diagnostic tests on the residuals. Analysis of the residuals indicated that none of the autocorrelations or partial autocorrelations (for lags 1–36) was significant at the .05 level. A similar conclusion was indicated by the Ljung-Box test for the joint significance of residual autocorrelations. The Ljung-Box statistics were $Q=9$ for lags 1–12, $Q=18$ for lags 1–24, and $Q=25$ for lags 1–36; these values were distributed as χ^2 with 8, 20, and 32 degrees of freedom for the three sets of lags, respectively. None of these values approached statistical significance ($p>.25$ for each); this is consistent with the hypothesis of random noise disturbance.

Table 2 lists the parameter estimates and their corresponding significance tests. The intervention parameter was −543.1, $t(160)=-2.02$, $p<.025$. These results indicate that there was a significant reduction in crime in Puerto Rico in April 1984, with the establishment of the required group participating in the group practice of the Transcendental Meditation and TM-Sidhi program, and an increase in crime in July 1984, with the departure of the group. The intervention parameter gives the joint estimate of the average monthly decrease or increase in crimes in Puerto Rico associated with the establishment and departure, respectively, of the required number of group participants in the technology.

Table 2

Intervention Analysis Parameters for Monthly Crime Totals in Puerto Rico

Parameter	*Estimate*	*t(160)*
Intervention	−543.1	−2.02*
One Month Autoregressive	−0.255	−3.86‡
One Year Autoregressive	0.217	3.12†
Two Year Autoregressive	0.331	4.81‡

*$p<.025$, one-tailed. †$p<.01$, two-tailed. ‡$p<.001$, two-tailed.

Discussion

A significant decrease in crime in Puerto Rico was found with the establishment of a group of the required size practicing daily the Transcendental Meditation and TM-Sidhi program. In addition, the departure of the group was associated with an increase in crime.

Alternative causes must again be considered. One class of alternative hypotheses concerns other forms of intervention in Puerto Rico that could have been responsible for the variations in crime at this time, such as police department programs. There were no such new programs at the times assessed in this study (April or July 1984), although there was the continuation of an existing police program. The Puerto Rico Police Department attributed an apparent decreased trend of crime in late 1982 to air-ground police vigilance using helicopters, patrol cars, and motorcyles ("Crime drop," 1982). The drop in crime was temporary, and crime continued to rise afterward. Two newspaper articles differed on the date at which such vigilance procedures were inaugurated. The police indicated that in May of 1980 the procedures were begun with 2 helicopters, 15 motorcycles, and 12 cars; in January 1983, the department had 2 helicopters, 10 motorcycles, and 27 cars ("Year-end crime drop," 1983). Thus, although the department had increased the number of police cars by 15 and decreased the number of motorcyles by 5, the program was essentially the same except for allowing direct communication between helicopters and cars ("Year-end crime drop," 1983).

In order to assess whether the establishment of the vigilance system in May 1980 had a significant effect on crime reduction, an intervention analysis was also run for the intervention of the vigilance system for this time. The same noise model was used as for the major analyses above. The police intervention was defined as zero everywhere except in May 1980 and thereafter; the *t*-statistic for the intervention was 0.62. Residuals were comparable to the previous major analysis, indicating that the model was specified correctly. Thus, the establishment of the police air-ground vigilance plan in May 1980 was not associated with a significant change in crime during the period of this study.

One potentially confounding influence with respect to the experimental variable must also be considered. There was a large assembly for participants in the TM-Sidhi program during the first two weeks of July, 1984, in the United States, which the group from Puerto Rico left to attend. The number of participants (about 4000) was in excess of the number predicted to be required for English-speaking North America (1600) although less than the number required for a global effect (7000). When the data for the Puerto Rico crime series are forecast, using the noise model above, for April-September, the July total was still below its forecast value by 43 per cent of the original

April decrease, and sequentially approached the forecast totals more closely in August and September. It is not possible to reliably attribute this to a specific cause, either to the July assembly or the residual effect of the predicted influence of the Puerto Rico group from April to June. The effect of large assemblies of participants in the Transcendental Meditation and TM-Sidhi program are being systematically assessed, and the results of this research will be reported separately (Cavanaugh, Orme-Johnson, and Gelderloos, in press; Orme-Johnson, Cavanaugh, Alexander, Gelderloos, Dillbeck, Landford, and Abou Nader, in press; Orme-Johnson, Dillbeck, Alexander, Chandler, and Cranson, 1985). The relationship between local and more global variations in the number of participants in the technology adds another level of complexity to the study of effects on social change, which might be explored by future research.

The results of the present study, in terms of both the onset and removal of a predicted influence on monthly crime totals, is consistent with the results of previous research, and no alternative explanation is indicated by police practice. The next study assesses the effect of a similar large group of participants in the Transcendental Meditation and TM-Sidhi program on crime totals at the territorial scale.

Study 3

Method

Sample. A large group of teachers of the Transcendental Meditation program, all of whom practice the TM-Sidhi program, came to Manila, Philippines in mid-August, 1984 because of the demand for the TM program in educational and rehabilitative settings in Manila. Altogether approximately 1500 participants in the Transcendental Meditation and TM-Sidhi program came to Manila in August and September; most stayed in Manila and a few went to provincial areas. Several thousand individuals in Metro Manila and the provinces of the Philippines were instructed in the TM program during this period.

The square root of one per cent of the 53 million people of the Philippines is approximately 750 people required for the daily group practice of the TM and TM-Sidhi program to create the Maharishi Effect on a national scale. For the eight million population of Metro Manila, which is approximately equivalent to the National Capital Region for the Philippines, the square root of one per cent of the population is about 300. The total number of experts in the technology declined gradually from September until January; the number exceeded 750 for a large period of the time during the period between when the group first came and the end of January, when a large ma-

jority of those remaining had to leave. However, there was not an opportunity for daily group practice in one place. Individuals stayed in a number of hotels in groups of various sizes; the largest number participating in the TM-Sidhi program together each day as a single group was about 250. Thus, the effective number to create the Maharishi Effect was at least the number required for Metro Manila, although the upper limit of effect in this instance is not easy to specify.

Measures. Weekly crime index totals for Metro Manila as a whole were able to be obtained from Police Headquarters in Manila. The crime index is modeled on the FBI Uniform Crime Index in the U.S. prior to 1979, including the same categories of offenses. The weekly time series began on December 31, 1982 and ran until March 7, 1985. The experimental period, in which there were more than the square root of one percent of the population of Metro Manila participating in the group practice of the TM-Sidhi program, was from the week beginning August 17, 1985 until the week ending January 24, 1985, when the last large group of over 500 left.

Procedure and data analysis. The time series was hypothesized again as a noise model plus a zero-order transfer function, i.e., a change in level associated with the presence of the group of TM-Sidhi program participants. An additional parameter was added for the postintervention period after the departure of the last large group of participants. The noise model was diagnosed on the entire series of 114 data points prior to adding intervention and postintervention parameters.

Results

A plot of the series indicated that there was not homogenous variance throughout the series. For this reason, the raw totals were subjected to a natural log transformation prior to diagnosis of the noise model. The noise model required seasonal autoregressive parameters of the eighth, eleventh, and sixteenth order (approximately two, three and four months), and a constant term (mean of the series). The noise model for the present series can therefore be written as $N_t=(1-\phi_1 B^8-\phi_2 B^{11}-\phi_3 B^{16})^{-1}a_t+c$, where terms are as previously defined. All parameters were statistically significant, and the model successfully transformed the series into a set of random disturbances around a zero mean. None of the residual autocorrelations or partial autocorrelations up to lag 36 were statistically significant; in addition, the Ljung-Box test for the joint significance of residual autocorrelations was also consistent with the hypothesis of a random series. The Ljung-Box statistics at lags 1-12, 1-24, and 1-36 were $Q=6.1$, $Q=16$, and $Q=25$, respectively, distributed as χ^2 with 8, 20, and 32 degrees of freedom ($p>.50$ in each case).

The next step of the analysis was to add the intervention parameter and

the parameter for the postintervention period. The intervention parameter was significant (t (92)$= -2.86$, $p<.005$, one-tailed), indicating a decrease in weekly crime totals during the intervention period. The postintervention parameter of .068 reflected a nonsignificant change from the baseline mean during the postintervention period (t (92) = 0.79, *n.s.*). Because the postintervention parameter was not significant, it was omitted from the model and all parameters were estimated again. Diagnostic tests on the residuals of the final complete model indicated that the model was adequate. The Ljung-Box statistic for the joint significance of residual autocorrelations had values of 8.3 at lags 1-12, 18 at lags 1-24, and 26 at lags 1-36; these were distributed as χ^2 values with 7, 19, and 31 degrees of freedom, respectively ($p>.25$ in each case). None of the autocorrelations or partial autocorrelations of the residuals to lag 36 was statistically significant. Table 3 lists the parameters of the analysis and their significance tests. The significant intervention parameter of -0.1292 in the natural log metric may be transformed into a percentage change in the expected value of the process associated with the intervention (McCleary and Hay, 1980, p. 174), yielding a 12.1 percent decrease in the case of the present intervention.

Discussion

There were no confounding events of a legal nature or changes in the police reporting procedures or policies during the period of this study that might serve as alternative explanations for the decrease in weekly crime totals during the intervention period. Cyclical variations in crime patterns are ruled out as an explanation by virtue of the time series analysis. A long-term general decrease in crime does not seem a viable explanation in light of the fact that the postintervention mean was not significantly different from that of the baseline period.

Table 3

Intervention Analysis Parameters for Weekly Crime Totals in Metro Manila, Philippines

Parameter	*Estimate*	*t(93)*
Intervention	−0.129	−2.83*
Eight Week Autoregressive	0.341	3.42‡
Eleven Week Autoregressive	−0.287	−2.93†
Sixteen Week Autoregressive	−0.374	−3.63‡
Contant (Mean)	4.358	241.63‡‡

*$p<.005$, one-tailed. †$p<.01$, two-tailed. ‡$p<.001$, two-tailed. ‡‡$p<.0001$, two-tailed.

It is also necessary to consider turbulence in the social and political environment as a possible confounding factor. The arrival of the group of teachers of the TM program occurred during a period of great political tension in Manila rather than a time of calm. Opposition leader Benigno Aquino had been assassinated on August 21, 1983, and the following year was marked by numerous demonstrations in Manila, a number of which had ended in violence. At the time the first large group of teachers of the TM program arrived, the week of August 13–17, there was considerable apprehension about the upcoming mass rallies marking the first anniversary of Aquino's death; however, there was no violence. A march of 10,000 on August 17 to the Capitol Building was stopped by police; "Riot policemen and protesters shook hands after a six hour stand-off at the Quezon City Welcome Rotunda," noted the August 18 *Daily Express* ("Riot policemen," 1984). An editorial in the August 20 *Bulletin Today* stated, "A political miracle of sorts happened last Friday. And it was a most welcome one because it came like a sudden ray of hope, a burst of sunlight, breaking through the thick cloud of confrontation and violence that has marked many mass actions these days" (Aquino, 1984). On August 21, the major rally in Manila was estimated by most sources at about 500,000 and it went without incident; in fact, the *Times Journal* of August 22 noted that "a festive mood pervaded yesterday's march and rally" ("Peaceful, festive," 1984). An August 24 editorial in *Tempo* stated, "Frankly, up to now, we could not believe how a million people who demonstrated to air their grievances could have behaved the way they did last Tuesday. Perhaps the law enforcers and organizers of the rally themselves expressed the same disbelief in the peaceful staging of the rally" ("What a peaceful rally," 1984). A similar editorial in the next day's *Manila Times* suggested, "The political maturity of the people has been demonstrated in the peaceful August 21 rally at the Rizal Park. And this augurs well for the country" ("What the August 21 rally proved," 1984).

The group of TM-Sidhi program participants thus came during a time when there was a background of political tension, yet the actual days immediately after their arrival were marked by reduced turbulance. The previous trend of political events therefore do not serve as a viable alternative explanation of the changes in crime trend noted in this study; nor do they serve as an explanation of the increased calm noted by journalists. Rather, the reduced political tension appeared as another indicator of a more general positive change in the society. It was not possible to obtain data appropriate for rigorous time series analysis of these trends. However, it should be noted that the effect of increased coherence in society is predicted to not be limited only to crime, but also to include other social indicators. Other studies, noted briefly in the general discussion, have found reduced violence in troubled areas with the establishment of groups of sufficient size participating in the TM-Sidhi program.

There was also the opportunity to test the effect of a previous large group of TM-Sidhi program participants in the Philippines. The next study evaluates the effect of this group.

Study 4

Method

Sample. At the end of December, 1979, approximately 400 individuals were instructed in the TM-Sidhi program in Manila, Philippines. The instruction was part of a business venture designed specifically to create a large group of individuals practicing the TM-Sidhi program together daily. After the beginning months, in which the entire group practiced the technology before and after the work day as part of their job, there was a gradual decline in the numbers employed and therefore practicing together; slightly more than half of this group were still together as part of the job by the end of 1981. The number 400 is greater than the square root of one percent of the population of Metro Manila and approaches the predicted number for the country as a whole. We therefore decided to investigate the possible effect of the group on an index combining Metro Manila and national data because of the regularity of group practice and substantial size and relative stability of the group.

Measures. The dependent variable or endogenous time series for the present study was an index consisting of the combination of several measures of reduced social disorder and improved quality of life.

Monthly crime index data for Metro Manila was obtained from Police Headquarters in Metro Manila for the period from January, 1977 to December, 1981. Prior to January, 1977 there were a number of missing data points and substantial changes in the level of reported crime that were the apparent result of changes in police reporting procedure. The crime index is the same as that used in Study 3.

Vital statistics were also available from the Census and Statistics Bureau for the nation as a whole by month up to December, 1981. Monthly foetal deaths and other deaths were the only unambiguous indicators of quality of life (in contrast to such variables as births and marriages). Violence in the nation was a contributor to deaths; martial law, imposed since 1972, was lifted only in December of 1980, and even in early 1984 approximately 350 deaths per month were due to guerilla activity in the nation (Atadero, 1984).

Procedure and data analysis. The primary strategy motivating the selection of an index comprised of the combination of several dependent measures was to increase the power of the statistical analysis by reducing the noise or variability of the series. Because the size of the group of participants in the

Transcendental Meditation and TM-Sidhi program was larger than that predicted to be required for a regional effect yet somewhat less than predicted for dramatic effects in national life, and because the dependent variables represented a combination of regional and national trends, we felt that the "signal to noise ratio" might be quite low. By adding several series together, the random variation tends to cancel out, while the influence of a consistent effect on each variable is strengthened. This is the same approach used in the signal analysis of evoked potentials in EEG research, where a faint signal must be disembedded from a very noisy time series.

Data were available for all three variables between January, 1977 and December, 1981. Prior to that time, the crime totals were neither reliable nor uniformly available, and after 1981 the vital statistics were not available at the time of this study (the end of 1984). Before being combined into a single index, each of the series was transformed into a set of z-scores, so that all three series had zero mean and unit variance. The variables were then added at each time point, to create the quality of life index.

Because the time series was quite short, the noise model was diagnosed with the entire series, prior to adding the intervention parameter. With regard to the intervention parameter, a unique situation was presented in the fact that the group of participants in the Transcendental Meditation and TM-Sidhi program was gradually reducing over the time of the study to a value certainly less than the required number, rather than being constant or suddenly departing at a certain point. This type of intervention, where the effect of the independent variable is diminishing over time, is expressed in ARIMA impact assessment models as an abrupt, temporary intervention. Such an intervention is mathematically expressed as a "first-order transfer function" applied to the first difference of the binary intervention series. That is, rather than the zero-order transfer function added to the noise model to give $Y_t = \omega_0 + N_t$, the model is expressed as $Y^*_t = \delta_1 Y^*_{t-1} + \omega_0(1-B)I_t$ (McCleary and Hay, 1980, p. 165); in this latter formulation, Y^*_{t-1} is the observation of the time series at time $t-1$ after adjusting for the noise model, with expected value of zero, and $(1-B)I_t$ is the first difference of the intervention step function (where B is a backward shift operator and $(1-B)$ is an operator to take the first difference); thus, the expression states that the intervention effect is ω_0 at the first observation of its onset, and decreases by an additional power of the parameter δ_1 at each later time. When this model is tested, both intervention parameters ω_0 and δ_1 are estimated.

Results

The noise model for the entire series of 60 data points was an autoregressive model with significant parameters of the second order and the twelfth order

(yearly seasonality). The yearly seasonality was best modeled as a multiplicative first order autoregressive component. The noise model for the series was therefore $N_t=(1-\phi_1 B^2)^{-1}(1-\phi_2 B^{12})^{-1}a_t$, where terms are as previously defined. The model was adequate, as indicated by diagnostic tests. The Ljung-Box test of joint significance of autocorrelations of residuals was 11 for lags 1–12, 25 for lags 1–24, and 37 for lags 1–36; these statistics are distributed as χ^2 with 10, 22, and 34 degrees of freedom, respectively ($p>.25$ in each case). There were no significant autocorrelations or partial autocorrelations of residuals up to lag 36.

The intervention parameters were then jointly estimated with the noise model for the entire series, yielding the parameter estimates and significance tests given in Table 4. Both intervention parameters were statistically significant, indicating an abrupt temporary effect of the intervention. The full model was also very adequate, as indicated by diagnostic statistics; the Ljung-Box test of joint significance of residual autocorrelations gave values of 5.2 at lags 1–12, 12 at lags 1–24, and 30 at lags 1–36. These values are distributed as χ^2 with 8, 20, and 32 degrees of freedom, respectively ($p>.50$ in each case). None of the autocorrelations or partial autocorrelations of residuals up to lag 36 were statistically significant. The intervention parameter (ω_0) of -2.55 gives the number of index units of immediate change with the creation of the group of participants in the Transcendental Meditation and TM-Sidhi program (the index is the sum of z-scores for the three variables). The second intervention parameter (δ_1) of .834 indicates that for each subsequent month the intervention effect was 83.4 percent of the previous month.

Discussion

The creation of an index of quality of life from several variables appeared successful in providing a sensitive indicator of the effect studied here at a

Table 4

Intervention Analysis Parameters for 1977–1981 Monthly Quality of Life Index, Metro Manila and Philippines

Parameter	*Estimate*	*t(41)*
Immediate Intervention	−2.550	−2.35*
Intervention Decay Rate	0.834	4.85**
Bimonthly Autoregressive	0.652	5.00†
Twelve Month Autoregressive	0.478	4.08†

*$p<.025$, one-tailed. **$p<.001$, one-tailed. †$p<.001$, two-tailed.

scale reflecting a combination of regional and national data. This was done because the number of participants in the Transcendental Meditation and TM-Sidhi program was the square root of one percent of a population between regional (Metro Manila) and national levels.

With regard to the specific variables comprising the index, the accuracy of death data is very high among social variables. Concerning the accuracy of the crime data, the major Manila newspaper, *Bulletin Today*, was reviewed to see if there were any major changes in police practices during the intervention period. A report was found in the August 3 issue of 1980 of a major anti-crime drive in which 4800 persons were arrested in Metro Manila in the three-month period ending June 30, 1980 ("Crimes report," 1980). However, the monthly crime totals did not reflect any substantive change during these months. The news report indicated that the arrests were preventive in nature, of those with known records but not for specific crimes; thus, the temporary arrests did not reflect additional known crimes. (Several months later, in December, 1980, martial law was lifted.) A planned drive against drug abuse was also announced in August; there was an increase in crime totals in August, but the degree to which drug-related offenses contributed to the increase could not be established ("Metro mayors," 1980). Considering the index as a whole, there seems to be no alternative explanation for the decrease measured in this study associated with the onset of the experimental intervention.

The most interesting aspect of the present study is that the functional form of the intervention effect was parallel to the size of the group participating in the collective practice of the Transcendental Meditation and TM-Sidhi program, indicating a relatively gradual decline in the size of effect. An additional feature of the present study is that the effect was found generalized to an index of quality of life. The next study takes the same approach and includes a broader set of quality of life variables combined into a total index.

Study 5

Method

Sample. June of 1978 marked the beginning of a "Global Ideal Society Campaign" designed by Maharishi to first demonstrate the Maharishi Effect on an extended scale by creating large numbers of participants in the Transcendental Meditation and TM-Sidhi program at the state or provincial level. Rhode Island was among the one or two provinces or states selected for this purpose in each of 20 of the world's largest countries. The campaign began in Rhode Island on the 12th of June 1978 with the arrival of almost 300 teachers of the TM program who also practiced the TM-Sidhi program, who then went to cities throughout the state in teams ranging in size from 2 to 46. The

visiting teachers left Rhode Island on the 12th of September.

Among the places where this project was undertaken, Rhode Island was unique in that the presence of the teachers alone, participating daily in the group practice of the TM and TM-Sidhi program, was sufficient to predict an improved quality of life according to the formulas previously described. In this case, the square of the number of TM-Sidhi program participants in each small group, added to the number of persons already instructed in the TM technique in the state, was right at threshold for predicting the extended Maharishi Effect.

Measures. The measurement approach of the present study was the same as that of the previous study, i.e., to examine an index comprised of a number of quality of life variables. This approach was taken for two reasons. We wished to assess possible changes in quality of life more holistically, and U.S. state data, available on a monthly scale, is quite good for such purposes. In addition, because the estimated cumulative effect of all participants in the Transcendental Meditation and TM-Sidhi program in the state was so close to the predicted required threshold, the strategy of combining variables to increase the signal-to-noise ratio was adopted here also.

The index comprised eight variables that were unambiguous indicators of the quality of life and for which monthly data were available. These variables were crime rate (rate of FBI Uniform Crime Index crimes), motor vehicle fatality rate, motor vehicle accident rate, death rate (other than motor vehicle fatalities), per capita beer consumption, per capita cigarette consumption, unemployment rate, and degree of pollution (particulates). These variables were chosen to represent a wide range of expressions of quality of life, including antisocial behavior, health-related behavior, actual health, economic well-being, and environment; a decrease in each variable indicates improved quality of life. Data were also collected for Delaware as well as Rhode Island; the uniformity of state data in the U.S. and the similarity of the two states allowed the possibility of Delaware being used as a control state.

The sources of the data are as follows: Federal Bureau of Investigation (crime); *Vital Statistics of the United States*, U.S. Bureau of Census (deaths prior to 1979); National Center for Health Statistics monthly vital statistics reports (deaths after 1978); Departments of Transportation in Rhode Island and Delaware (motor vehicle fatalities and auto accidents); Department of Employment Security, Rhode Island, and Department of Labor, Delaware (unemployment); United States Brewers Association, Washington, D.C. (beer consumption in barrels taxed); Tobacco Tax Council, Richmond Virginia (cigarette consumption in packages taxed); Department of Environmental Management, Rhode Island, and Department of Natural Resources and Environmental Control, Delaware (total suspended particulates in mean micrograms per cubic meter).

Unemployment as a variable in the index might be questioned because it is strongly influenced by regional and national trends, and is also influenced by factors that change in a longer time scale. However, employment is also directly dependent upon factors immediately associated with consciousness, such as creativity, motivation, and persistence. In addition, the use of the control state insures that only local trends in Rhode Island not reflected more broadly are assessed.

The inclusion of a pollution variable in the index might also seem surprising because immediate changes in pollution would be expected to be more a function of weather conditions than changes in the behavior of individuals or institutions. However, Maharishi specifically suggests that because pure consciousness is the unified field of natural law, one result of the extended Maharishi Effect should be increased balance in nature, in the direction supporting social well-being (Maharishi Mahesh Yogi, 1978, pp. 178–190). The pollution indicator broadens the index to reflect to some degree such a possibility. Particulates were the only pollution variable available as a continuous monthly time series from a single observation site in each state. Site 6 in Rhode Island (Westminster St. in Providence) was the only continuous source available during the study period in Rhode Island; site P1 in Delaware (Woodshaven Kruse School, Claymont) was suggested by state officials as the most representative urban station. Particulate figures for two months (February and March, 1975) were missing at the Delaware site and were substituted by estimates obtained by linear interpolation from January to April of that year.

Each of the variables was obtained on a monthly basis from January 1974 to December 1980, over two years after the experimental period; the length of the baseline period was dictated by the fact that auto accidents and traffic fatalities were available from Rhode Island only from January 1974. A series of this length (84 observations) was sufficient for time series analysis.

All variables were first converted into rates per population, except for unemployment, which was provided in rates by the agencies, and for pollution, which was left in its original unit of measurement. The monthly increments in population for Rhode Island and Delaware were computed by linear interpolation from April 1970 and April 1980 census figures as a basis for calculating rates.

Procedure and data analysis. A unique addition to the present study was the use of the state of Delaware as a control, since like Rhode Island it is a small coastal state located not far from major metropolitan areas. The time series approach and the control state facilitated assessment of whether the intervention effects were located in time and space as predicted. To directly assess the differences between Rhode Island and Delaware by a single time series analysis, a monthly ratio of Rhode Island rate divided by Delaware rate was formed for each variable. With this procedure any intervention effects would

reflect changes in Rhode Island which were not found in Delaware. Each variable was then standardized by converting it to a variable with mean zero and standard deviation one. The average of these standardized variables for each month was taken as the monthly index, the time series upon which analysis was performed. Effects found during the intervention period are thus expressed in the metric of average number of standard deviations from the mean of the ratio of the two states.

The intervention period did not exactly match the monthly data, because the intervention was from June 12 to September 12, 1978. The three-month intervention period was therefore defined as the months of July through September, 1978, since the first half of June was definitely not in the intervention period, while it was not unlikely that the effects of the intervention might continue in September, since not all participants left immediately. The post-intervention period was also modeled as a separate intervention parameter to test for long-term effects of the intervention even after the groups of TM-Sidhi program participants left Rhode Island.

The intervention assessment model tested was the zero-order transfer function model $Y_t = \omega_0 I_{0t} + \omega_1 I_{1t} + N_t$, where Y_t is the crime rate, I_{0t} is the intervention function which is zero before and after the intervention, I_{1t} is a post-intervention step function which is zero except after the intervention, and other terms are as previously defined. In the present case N_t was identified using the entire series (84 observations) because the preintervention baseline period was short.

Results

The model for N_t included autoregressive parameters of the third order (quarterly seasonality) and of the twelfth order (yearly seasonality). Thus, $N_t = (1 - \phi_1 B^3 - \phi_2 B^{12})^{-1} a_t$, where terms are as previously defined. The intervention component (ω_0), the post-intervention parameter (ω_1), and the noise model (N_t) were then jointly estimated from the series. Diagnostic tests of the residuals of the model were acceptable. No autocorrelations or partial autocorrelations of residuals were significant at the .05 level, consistent with the hypothesis of a serially independent disturbance. The Ljung-Box test for the combined significance of the observed residual autocorrelations gave a Q statistic $Q = 32$ for autocorrelations one through 36, distributed as χ^2 with 32 degrees of freedom, $p > .40$.

Table 5 lists the parameter estimates and their significance tests. The intervention parameter was -0.41, $t(68) = -2.64$, $p < .01$, one-tailed, indicating a significant decrease in negative trends monitored by the index during the intervention period. There was also a significant but less pronounced improvement after the intervention, indicated by the postintervention parameter of -0.25, $t(68) = -2.96$, $p < .01$, two-tailed.

Table 5

Intervention Analysis Parameters for 1974–1980 Monthly Quality of Life Index for Rhode Island

Parameter	*Estimate*	*t(68)*
Intervention	−0.409	−2.64*
Postintervention	−0.247	−2.96‡
Three Month Autoregressive	0.271	2.44†
Twelve Month Autoregressive	0.239	2.34†

*$p<.01$, one-tailed. †$p<.025$, two-tailed. ‡$p<.01$, two-tailed.

Discussion

The results of this study again indicate, at the state level, an effect of a direct intervention of a large group of participants in the Transcendental Meditation and TM-Sidhi program on improved quality of life. This conclusion is strengthened by the facts that the improvement in the quality of life in Rhode Island in the summer of 1978 had been predicted in advance, and that it occurred in Rhode Island in contrast to the control state Delaware. There were no alternative explanations found for the sudden improvement in the quality of life in Rhode Island during this period.

The significant, although smaller, post-intervention effect found in this study was unique. Teachers of the TM program in Providence stated that a substantial number of citizens of Rhode Island were instructed in the TM-Sidhi program in the two years following the experimental period, with Providence residents practicing daily as a group; far fewer were reported to be instructed in Delaware (Providence, 1983). However, precise figures of the number of participants in the group practice of the technology in Providence or in other cities of Rhode Island or Delaware are not available for detailed study of the post-intervention period.

General Discussion

The five studies reported in this paper indicate a replicable effect of improved quality of life in whole social systems associated with sufficient numbers of individuals participating in the Transcendental Meditation and TM-Sidhi program. This result was found using time series analysis to measure the effect of experimental interventions involving large groups of participants in the TM-Sidhi program at the territorial, state, or regional/national level. The effects were also found in quite different settings, such as the United States, Puerto Rico, India, and the Philippines, indicating a phenomenon apparent-

ly robust across a variety of cultural conditions.

It is unlikely that the results, found consistent with theoretical predictions, were coincidence; the joint probability of the effects reported here is less than 10^{-9}.[4] In addition, the total number of studies reporting this effect, including comparable experimental time series studies by other authors, is over 25 (Chalmers et al., in press).

It does not seem to us that the results of the present studies can be accounted for by behavioral interaction between the population of participants in the Transcendental Meditation and TM-Sidhi program and the general population. In the five studies, the proportion of participants in the TM-Sidhi program was extremely small (the square root of one percent), and the participants were often involved in special residential courses of limited duration in which they did not interact with the general population (e.g. Delhi or Puerto Rico courses). Moreover, even in those studies in which there was an attempt to interact as much as possible with the larger population of society (Rhode Island or the first study of Metro Manila in the Philippines), the sizes of the groups are too small for an effect to be explained on the basis of social interaction according to any existing principles of social psychology. The groups, for example, were smaller than the existing police forces.

If the effects found in these studies are not the result of behavioral interactions with the population of the social system, then a deeper level of connection between individuals in society is indicated, one which is directly related to the quality of behavior of the whole society. Some kind of field effect is implied by these results, by virtue of which an influence is spread throughout a whole social system; the facts that this influence has been predicted for 25 years, and that it is experimentally associated with a group of individuals participating in a technology of consciousness strongly suggest that the field through which the effects found here are generated is directly connected with the nature of consciousness. This is consistent with the theoretical perspective presented here, that of Vedic psychology, which identifies a field of pure consciousness at the basis of individual and collective consciousness, and which posits that connecting individual and collective consciousness with this field results in social behavior on a large scale that is more progressive and supportive of collective interests.

In order to understand this phenomenon more fully, the relationship between the field of pure consciousness and the known physical fields of nature needs to be articulated. Although it is now known that individuals are sensitive neurophysiologically and behaviorally to some types of extremely weak electromagnetic fields (e.g. Adey and Bawin, 1977), neither the range of

[4]Exact probabilities for the intervention effects of the time series studies were combined (Winer, 1971, p. 49), yielding an overall χ^2 value of 69.561 with 10 degrees of freedom.

distance of effects found here nor the generation, through neurophysiological processes, of electromagnetic field effects of sufficient strength to affect behavior can be accounted for by properties of electromagnetic fields or any of the other known fields. One researcher in unified field theories has suggested that the long-range field effects reported here are not inconsistent with the possibility of non-local influences recently proposed by Hawking (1984) as associated with the quantum geometry of the Planck scale of superunification (Hagelin, 1987). If so, this points to a connection between the field of pure consciousness and the unified field. This is also Maharishi's perspective, that the field of pure consciousness is the unified source of objective and subjective existence, the unified field of natural law (Maharishi Mahesh Yogi, 1985).

The theoretical implications of these studies are thus quite remarkable, suggesting a more fundamental and unified level of relationship between individuals than has before been subjected to experimental assessment. The practical implications of this research are equally important. Although most of the studies in this paper focused on crime as an indicator of incoherence and turbulence in society, the last two studies generalized the range of effects to other social indicators; in fact, the framework that generated these studies proposes that major indicators of social turbulence and disorder should be measurably improved by the Maharishi Effect.

Among findings to be reported in future papers are extensions and replications of initial time series studies indicating improvements in a number of quality of life parameters at the national level in the United States on periods when the square root of one percent of the U.S. population was participating in the group practice of the TM-Sidhi program (Dillbeck, Larimore, and Wallace, in press; Lanford, Dixon, and Reeks, 1984). In addition, time series studies on the international level have been performed in which reduced violence in Lebanon has been found during four periods in which groups of participants in the TM-Sidhi program of the required size have been either in Lebanon or in other countries at various distances (Alexander, Abou Nader, Cavanaugh, Davies, Dillbeck, Kfoury, and Orme-Johnson, in press; Orme-Johnson, Alexander, Davies, Chandler, and Larimore, in press). Most dramatically, improved social indicators on a global level across a range of variables were found when large assemblies were held in which the number of participants in the group practice of the Transcendental Meditation and TM-Sidhi program exceeded or approached the square root of one percent of the world's population [7000 individuals] (Cavanaugh et al., in press; Orme-Johnson, Cavanaugh et al., in press; Orme-Johnson et al., 1985). Papers are being prepared that extend these findings and assess the effects of other large assemblies of participants in the TM and TM-Sidhi program.

From a practical perspective, the need for an effective and non-invasive

technology to improve the quality of life and behavior in society strongly suggests the value of continued application and evaluation of this effect on large social systems. Careful consideration of the phenomenon is demanded both by the cumulative weight of the data and by the needs of the time.

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