# International Peace Project in the Middle East

## THE EFFECTS OF THE MAHARISHI TECHNOLOGY OF THE UNIFIED FIELD

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This prospective social experiment tests a new theory and technology for alleviating violent conflict through reducing societal stress in an underlying field of "collective consciousness." It was predicted that group practice of the Maharishi Technology of the Unified Field (the Transcendental Meditation and TM-Sidhi program) during August and September, 1983, in Jerusalem, would reduce stress in the collective consciousness and behavior of Israel and Lebanon. Box-Jenkins ARIMA impact assessment, cross-correlation, and transfer function analyses were used to study the effects of changes in the size of the group on several variables and composite indices reflecting (a) the quality of life in Jerusalem (automobile accidents, fires, and crime), (b) the quality of life in Israel (crime, stock market, and national mood, derived from news content analysis), and (c) the war in Lebanon (war deaths of all factions and war intensity, derived from news content analysis). Increases in the size of the group had a statistically significant effect in the predicted direction on the individual variables and on all composite quality-of-life indices. The effects of holidays, temperature, weekends, and other forms of seasonality were explicitly controlled and could not account for these results. Cross-correlations and transfer functions indicated that the group had a leading relationship to change on the quality-of-life indicators, supporting a causal interpretation.

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JOURNAL OF CONFLICT RESOLUTION, Vol. 32 No. 4, December 1988 776-812

The imperative of establishing world peace has deeply motivated the search for innovative methods of conflict resolution (e.g., Fogg, 1985). This article presents the results of an empirical test in the Middle East of a new approach to peace through reduction of stress in the underlying "collective consciousness" of society (Maharishi, 1986a, 1986b; see also Dillbeck et al., 1987; Orme-Johnson and Dillbeck, 1987; Orme-Johnson, Gelderloos, and Dillbeck, in press).

## STRESS IN COLLECTIVE CONSCIOUSNESS: THE SOURCE OF VIOLENT CONFLICT

Numerous theorists in the field of conflict resolution identify societal stress as a primary source of violent conflict (e.g., Feierabend and Feierabend, 1971a, 1971b; Linsky and Strauss, 1986; McKinney and Tiryakian, 1970; Sorokin, 1957). Political psychologists such as Ralph White (1984, 1986) argue that in an environment where tensions are high, efforts for peaceful resolution of conflict can succeed only in the context of concurrent steps for "drastic tension reduction." Stress fuels political violence either directly or indirectly through exacerbating misperception (Jervis et al., 1985), irrationality in decision making (Janis, 1982; Lebow, 1987), and rigidity in attitudes (Tetlock and McGuire, 1986), both in decision makers and in the people they represent.

According to Maharishi Mahesh Yogi (1979: 38), the founder of the Transcendental Meditation (TM) and TM-Sidhi program, it is the accumulation of stress in collective consciousness that predisposes society to go to war: "All occurrences of violence, negativity, conflict, crises, or problems in any society are just the expression of growth of stress in collective consciousness. When the level of stress becomes sufficiently great, it bursts out into large-scale violence, war, and civil uprising necessitating military action." It is proposed that drastic reduction of societal tension can be provided through a program

AUTHORS' NOTE: The International Peace Research Project in Israel was codirected by Drs. Alexander and Orme-Johnson. It was funded in part through a grant in honor of William Ellinghaus, then president of American Telephone and Telegraph Company, from the Fund for Higher Education in New York City. The authors would like to express their appreciation for this support. The authors would also like to thank Gad Tick, Ronnie Newman, Ami Rokeah, and Vicki Alexander for their leadership in organizing many aspects of the experiment; Nita Travis for her help in analyzing the data and preparing the manuscript; Fred Travis for preparing the review of the biological effects of EM fields; Dr. Rhoda Orme-Johnson and Susan Shatkin for their editorial suggestions; Dr. John Hagelin for equation 1; Dr. Kenneth Cavanaugh for his consultation on the time series analysis; and all the Israeli TM meditators for their participation in this research and for their continued efforts to create peace in the Middle East.

introduced by Maharishi to systematically reduce stress in collective consciousness. In order to understand the possible effects and underlying mechanisms of such a program, we will first briefly consider the nature of collective consciousness, its origins, and how it can be influenced.

In Maharishi's theory, collective consciousness is the wholeness of consciousness of the group, that is more than the sum of the consciousnesses of all individuals composing that group. Just as the consciousness of the individual determines his or her thought and behavior, the collective consciousness of society governs the activity of social life. Thus a level of collective consciousness corresponds to each level of social organization—family, community, city, state, nation, and world (Maharishi, 1976: 2). Individual consciousness is the basic unit of all levels of collective consciousness, influencing them all and in turn being influenced by them (1977: 124). The primary determinant of the quality of behavior in society is the level of "coherence" in collective consciousness (1978: 123-129). Just as the quality of individual consciousness reflects the level of functional integration among the various subcomponents composing the nervous system, societal coherence is said to be a function of the degree of cooperative or complementary interaction among the individuals and subgroups that society comprises. Societal coherence is reflected in the spontaneous integration of the needs of the individual and of various groups with those of society as a whole; societal incoherence results in the frustration of individual and group needs, and hence in collective conflict and stress (1978: 146-156).

The concept of a pervasive field of consciousness underlying both the individual and society is central to Eastern as well as Western philosophical traditions. Two founders of modern psychology, Gustav Fechner and William James (1977), argued that there exists a continuum of consciousness uniting individual minds that could be directly experienced if the psychophysical threshold of perception were sufficiently lowered through refinement in the functioning of the nervous system. Carl Jung (1959) and Emile Durkheim (1951: 310, 312-313; Lukes, 1973: 4) also proposed theories of collective consciousness, although, as McDougall (1973) pointed out, such theories will not have a major influence on mainstream psychology until they are empirically testable.

The Vedic tradition of India, systematically presented by Maharishi (1986b) as Vedic Science, posits a unified field of "pure consciousness" as the basis of the diverse activities of all individual minds. All processes of thought and perception are viewed as fluctuations or qualified expressions of this underlying unqualified, least-excited state of con-

sciousness. Maharishi (1969: 470) likens the individual mind transcending its more active levels and experiencing its basis in pure consciousness to a localized wave settling to become the silent, unbounded surface of the ocean. Such experiences are said to create nonlocal, fieldlike effects of order and coherence in the environment, just the opposite to the incoherent effects of stress. Thus, according to the classic text of Patanjali (1978), "yoga," or union with pure consciousness, is said to quell animosity in its vicinity. Hence a set of techniques derived from this tradition to promote experience of pure consciousness—the Maharishi Technology of the Unified Field (MTUF)—have the testable predication of improving quality of life in the surrounding population (Maharishi, 1986a, 1986b).

The most fundamental of these procedures is the Transcendental Meditation (TM) technique, which allows the mind to settle from its active states of thought and perception of external objects to its least-excited state, in which the only "object" of consciousness is pure consciousness itself. Wallace (1970) proposed that the experience of pure or transcendental consciousness (TC) is characterized by a psychophysiological state of "restful alertness" distinct from the ordinary states of waking, dreaming, and sleep. Subsequent research has confirmed that subjective experience of TC is correlated with unique neurophysiological changes, including virtual breath suspension and increased EEG coherence, an indicator of long-range spatial ordering of the brain (e.g., Badawi et al., 1984; Dillbeck and Bronson, 1981; Farrow and Hebert, 1982; Levine, 1976; Orme-Johnson and Haynes, 1981; see Alexander, Cranson et al., 1987, for a review).

This restful alertness experienced during the TM technique appears to be a distinctly effective means for "drastic tension reduction," as called for by White (1986) and other experts on conflict resolution. A recent quantitative meta-analysis of 31 studies indicated that TM produces twice the statistical effect size of resting with eyes closed on reduction of somatic arousal, as indicated by increased basal galvanic skin resistance and decreased respiration and plasma lactate (Dillbeck and Orme-Johnson, 1987). These changes promote marked stress reduction and enhanced functioning outside the practice. An exhaustive meta-analysis of 104 studies (Eppley et al., 1984) found the effect size of TM on trait anxiety reduction was again approximately twice as large as that associated with other forms of relaxation or meditation. Another meta-analysis yielded similar results on additional measures of psychological distress (Ferguson, 1981). Further, long-term reductions in physical illness rates and enhanced psychophysiological capacity to

cope with environmental stressors has been observed (Alexander, Langer et al., in press; Brooks and Scarano, 1985; Orme-Johnson, 1973, 1987).

The TM-Sidhi techniques, also employed in this study, consist of a set of advanced procedures to stabilize and integrate the experience of pure consciousness with specific psychophysiological channels of perception, cognition, and action by exercising the individual's latent capacity to consciously initiate thought and action from the underlying unified field of consciousness (Maharishi, 1986b: 29). Research indicates the TM-Sidhi program produces significant additional gains in neurophysiological integration and cognitive-behavioral performance to those found during the TM technique alone (Orme-Johnson and Gelderloos, in press; Orme-Johnson and Haynes, 1981; Wallace, Mills et al., 1983; Wallace, Silver et al., 1983; see Wallace, 1986, for a review).

Social scientists have identified a major source of collective stress and violence in "systemic frustration" of individual and collective progress (Gurr, 1971, 1972; Lebow, 1985); or in blocks to the satisfaction of deep "ontological needs" for identity, security, and effective participation, which lie at the basis of both individual and collective development (Azar and Burton, 1986). Indeed, Johann Galtung (1980, 1985) normatively defines peace as the absence of any avoidable impediment to realization of full mental and physical potential. Maharishi (1986a, 1986b) also identifies the origin of stress in blocks to individual development, and because the individual is seen as the unit of collective consciousness, restricted individual development can be identified as a fundamental source of collective stress as well. Therefore a requirement of peace may be to "unfreeze" the development of the individual.

Maharishi (1969, 1986b) has delineated a sequence of "postrepresentational" higher states of consciousness, based in growth of pure consciousness, that appear to extend far beyond the representational endpoint of "formal operations" described by Piaget (1970) (see Alexander, Davies et al., in press). This new framework is consistent with and extends Holt's (1986) view that peace requires the development of postformal operational "systems thinking"—a more comprehensive mode of thinking commensurate with the enormous complexities of the issues raised by nuclear technologies (see also Nelson, 1984; Stagner, 1977). A series of longitudinal studies indicates that marked reduction in stress and enhanced neurophysiological integration through the TM and TM-Sidhi programs appear to "unfreeze" development and reduce hostility, even in highly stressed adult populations otherwise recalcitrant to improvement, such as maximum security prisoners (Abrams and

Siegel, 1978; Alexander and Marks, 1982; Bleick and Abrams, 1987; Dillbeck and Abrams, 1987; see review by Alexander, Boyer, and Alexander, 1987).

Given the proposed reciprocal relationship between individual and collective consciousness (Maharishi, 1976: 2), it follows that reduction of stress and stimulation of development in a sufficient number of individuals in the population would create a general condition of increased coherence throughout collective consciousness, thereby decreasing violence and improving quality of life in society as a whole.

## EMPIRICAL RESEARCH ON COLLECTIVE CONSCIOUSNESS

Given the extent to which the TM program reduces stress and fosters development in the individual, an important theoretical and empirical question is how many individuals need to participate in this program in order to have an influence of increased coherence in the population as a whole. Based on the general observation in nature that the coherent elements in a system have a more powerful influence than the incoherent components, Maharishi similarly proposed that raising the coherence in even a small proportion of the population could be expected to stimulate increased coherence in society as a whole. As early as 1960, Maharishi estimated as few as 1% of a population practicing the TM technique would be sufficient to produce a measurable influence on improved quality of life throughout society. Over 30 studies on the effects of the TM and TM-Sidhi program on quality of life on the city, state, national, and international levels have been reviewed by Orme-Johnson and Dillbeck (1987). Studies conducted on the city level have consistently shown that 1% of the population practicing the TM program is sufficient to decrease societal incoherence as operationalized by reductions on such indicators as crime, accident, and suicide rates. (This phenomenon was named the "Maharishi Effect" by the first investigators to study it: Borland and Landrith, 1976.) For example, in 1973, Dillbeck, Landrith, and Orme-Johnson (1981) found decreased crime rate in all 24 U.S. cities (with populations over 10,000) that reached 1% TM participation in 1972, compared to 24 control cities matched for population size, geographic region, college population, and prior crime rate. In addition, the 1% cities showed a reduction in crime trend during the five-year period 1972-1977, compared to their own prior trend from 1967-1972, and in contrast to control cities. This study

also statistically controlled for a number of other variables known to affect crime, such as median years of education, per capita income, and percentage of population aged 15 to 29. These results were replicated in a study on a stratified random sample of 160 U.S. cities (25% of the total U.S. urban population) over a 15-year period, using cross-lagged panel correlation methods to address the issue of causality; increased TM participation in these cities was consistently followed by decreased crime rates in the following years (Dillbeck, 1981).

With the introduction of the more advanced TM-Sidhi program in 1976, Maharishi anticipated an even more marked influence of coherence in collective consciousness. He predicted that when the TM-Sidhi program was practiced in a group by as few as the square root of 1% ($\sqrt{1\%}$) of a population, there would be a measurable effect on standard indices of quality of life. This prediction is based on a field theoretic model describing the coherent superposition of amplitudes, in which the intensity of the effect generated is proportional to the square of the number of participants (Hagelin, 1987). For example, in coherent systems such as lasers, the coherent elements in the system have an influence that is proportional to their number squared, whereas incoherent elements generally have an influence that is proportional only to their number. Thus the predicted population size influenced by a given number of TM and TM-Sidhi program participants would be tentatively modelled by the polynomial:

$$ME = aN_1 + bN_2^2 \quad (1)$$

where ME (Maharishi Effect) is defined as the size of the population that is positively influenced by the number of independent meditators distributed throughout the population ($N_1$) and the number of individuals practicing the more advanced TM-Sidhi program collectively in one place ($N_2$). The quadratic term reflects the proposed coherent influence resulting from constructive interference of the group of $N_2$ subjects. Coefficients $a$ and $b$ are empirically defined constants, with data suggesting that both have an estimated value of approximately $10^2$ (for values of N over 100). The absence of a constant term follows from the assumption that the effect vanishes (and does not diverge) as N tends to zero. (Cubic and higher-order terms are neglected because they have no clear theoretical motivation). The apparent necessity for having a single group meet at one time and place to produce this $\sqrt{1\%}$ effect may again be understood with reference to coherent physical systems such as

lasers. In these systems, close proximity of elements is required to ensure that they have sufficient opportunity to stimulate coherent behavior in other members of the group.

Because relatively small numbers should be required to produce such a social coherence effect, this prediction can be tested by direct experimental intervention of small groups on a state, national, or even international level. For example, in five experiments by Dillbeck et al. (1987), time series impact assessment analysis (Box and Jenkins, 1976; McCleary and Hay, 1980) indicated significantly decreased crime in Puerto Rico, the Territory of Delhi, India, and the Philippines. Moreover, improvements were found in composite quality-of-life indices for Rhode Island and the Philippines during experimental periods compared to control periods during which group practice did not take place. The quality-of-life indices included crime rate, motor vehicle fatality rate, unemployment rate, and infant mortality rate. These experiments controlled for a number of alternative explanations, and the use of time series methodology allowed the reliable estimation of experimental effects independent of cyclical trends in time-dependent data. Similar findings were obtained on a more comprehensive quality-of-life index for the U.S. as a whole over a much longer period (e.g., Orme-Johnson, Gelderloos, and Dillbeck, in press), and on an international scale during brief experimental impact periods (e.g., Orme-Johnson, Cavanaugh et al., in press).

When immediate changes on a national or even international level can be precipitated by a very small group having virtually no direct interaction with the larger population, clearly such influences cannot be explained through direct behavioral contact. To understand such apparent action at a distance, further examination of possibly related phenomena in physical systems may be instructive.

## COLLECTIVE CONSCIOUSNESS AND QUANTUM FIELDS

In the history of physics, the need to explain action-at-a-distance phenomena, such as gravity and electromagnetism, gave rise to the concept of fields that mediate these influences. Indeed, action at a distance through underlying abstract physical fields, as in the transmission of radio or television signals through the electromagnetic (EM) field, has become a completely familiar concept within the lifetime of a

single generation. The question naturally arises, could known physical fields be involved in mediating such collective consciousness effects?

There is, in fact, growing evidence for direct effects of the EM field on biological systems—including circadian rhythms (Wever, 1977), EEG (Adey and Bawin, 1977), calcium ion flow in cerebral tissue (Bawin and Adey, 1976), simple reaction time (Hamer, 1968), response rate (Gavales-Medici and Magdeleno, 1975), fish orientation and navigation (Adey and Bawin, 1977), and bird navigation and bee communication (Keeton, 1969). It seems unlikely, however, that the human brain could emit EM radiation capable of being detected by other brains at a distance because the power of the EEG is orders of magnitude too small, even given the recent discovery that the nervous system is highly sensitive to EM radiation. (Tourenne, 1985, has argued, however, for the possibility of modulation of EM radiation in the microwave region by soliton oscillations of cortical pyramidal neurons.)

It also appears that the other three fundamental force fields, the strong and weak interactions and gravitation, are of inappropriate scales to mediate direct interhuman effects. The strong and weak interactions operate at a distance scale too small to explain effects occurring at macroscopic distances, as were involved in the research on collective consciousness. Likewise, any gravitational influence produced by a group of individuals would be negligibly small. A potential explanation for the apparent propagation of such coherent effects may lie, however, at the ultimate scale of superunification, the Planck scale of $10^{-33}$ cm and $10^{-44}$ sec, where the fundamental forces and matter fields are said to become fully unified (Green, 1985, 1986); nonlocal effects could be mediated through the agency of the unified quantum field due to the intrinsically nonlocal structure of space-time at this scale (Hagelin, 1987: 68).

If, as is proposed in current quantum field theory, the unified field is the source of all phenomena, it should be the source of subjective as well as objective existence. Indeed, since the unified field is the only dynamical degree of freedom present at the superunified scale, at that level the observer and observed both would be found within the same self-interacting dynamics of the unified field; hence it would be formally as much a field of subjectivity as of objectivity (Hagelin, 1987). Several physicists have noted that at fundamental scales, much of the objective character of macroscopic, classical physics begins to disappear and characteristically subjective qualities begin to emerge (Davies, 1984: 104-112; Llewellyn-Smith, 1981; Pagels, 1982). Striking parallels be-

tween the description of the unified field by the objective approach of modern science (Schwartzschild, 1985; Waldrop, 1985) and pure consciousness by the subjective approach of the ancient Vedic tradition suggest they may reflect different perspectives on the same fundamental reality (Hagelin, 1987).

The present theory proposes that through the MTUF, the localized conscious awareness of the individual becomes experientially connected back to pure consciousness, the unified source of order and intelligence at its base, thus increasing coherence, reducing stress, and accelerating development in the larger society. If the field of collective consciousness operates like known physical fields, then this influence of coherence would fall off at a distance from the individuals who initially generated it. If this effect is mediated by the unified field, however, it will not necessarily fall off as a precise function of the inverse square of the distance from the source, as is the case with other known fields (Hagelin, 1987; Hawking, 1984).

The purpose of this prospective experiment was to provide a critical test of this innovative approach to conflict resolution in a major trouble-spot area: the civil war in Lebanon. The Arab-Israeli conflict affects all aspects of life in Israel (Shamir and Sullivan, 1985) and, at the time of this study (the summer of 1983), Israel was heavily involved in the Lebanon crisis, with troops stationed deep inside Lebanon in the Shouf Mountains. The central prediction of the experiment was that establishing in Jerusalem a sufficiently large group of TM and TM-Sidhi practitioners (approximately $\sqrt{1}$ % of each population to be affected) would improve the quality of life in Jerusalem and Israel, and generate an influence of coherence extending into Lebanon, resulting in a calming of the conflict.

## METHODS

The experimental hypotheses and dependent variable measures (based on publicly available data sources) were lodged in advance of the study with independent review boards of scientists in both North America and Israel. The dates of the experiment—August 1 through September 30, 1983—were arbitrarily selected with respect to the social variables to be studied. After the first and second months of the experiment (prior to final data analysis), the review boards were also

informed of the daily number of participants in the group practice of the TM and TM-Sidhi program (the independent variable).

## INDEPENDENT VARIABLE

In order to assemble the group, a research project was announced to all practitioners of the Maharishi Technology of the Unified Field in Israel, inviting them to participate for whatever time period they could allot. The program was collectively practiced twice daily, once in the morning and once in the late afternoon, in a hotel rented for this purpose in East Jerusalem. Approximately half of the participants attended additional meditation sessions in the late morning and early afternoon. During the remainder of the day, participants had the option of viewing videotaped lectures, maintaining their ordinary or modified work schedules in Jerusalem and surrounding areas, or helping with the maintenance of the course itself (e.g., cooking or administration). In exchange for their participation, subjects' board and lodging were subsidized for the duration of their involvement in the study.

By subsidizing participation, the researchers were able to gain some control over the independent variable. The level of participation was experimentally elevated from August 15 to August 27 by also offering an advanced MTUF course as an additional incentive to participate during this time. This 13-day high period could be considered an experiment within the experiment. In general, however, level of participation also depended on such factors as when participants could schedule their vacations and the necessity for some students to return to school in September; for these reasons the group size was not completely under experimenter control and was not a truly randomized variable.

The independent variable used in the time series analyses was the daily number of subjects participating in either the morning or evening group practices of the MTUF, whichever was higher for a particular day. The number ranged from 65 to 241. The number of participants in the morning and evening programs tended to be quite similar and were highly correlated ($r = .90$). Outside of the scientists who were initially informed, no public or media announcements were made in advance of the study. There was minimal interaction between course participants and the larger population during the experiment, and subjects were asked not to discuss the precise nature of the study with nonparticipants. These procedures were followed in order to control for any potential societal expectation effects.

Israeli mediators already had been practicing the TM-Sidhi program in Israel over the previous seven years. The number of practicing together at any one time, however, remained well below the hypothesized minimum threshold of $\sqrt{1}\%$ of the population, which for Israel's four million people is a group of about 200. The hypothesis that the group of MTUF participants would influence the quality of life in the larger society when the group size reached $\sqrt{1}\%$ of the population was tested for three different population sizes (estimated figures for the period studied): (1) Jerusalem—429,000, including the Arab population; (2) Israel—5,304,000 total, consisting of 4,024,000 plus 1,280,000 for the West Bank and Gaza Strip; and (3) Israel and Lebanon combined—7,905,000 (Lane, 1985). For Jerusalem, Israel, and Israel and Lebanon combined, $\sqrt{1}\%$ is 65, 230, and 281, respectively. However, there were already more than 38,000 TM participants distributed throughout Israel and 2,000 in Lebanon at the time. This amounts to 0.51% of their combined populations, and from equation 1 it can be seen that the linear effect of these meditators would create coherence for 51% of the population. Taking this linear effect into account, and because the quadratic effect of those in the MTUF group is modeled as additive in equation 1, it is estimated that the MTUF group had to create coherence for only the remaining 49% of the population, which is 3,873,000 for Israel and Lebanon combined, $\sqrt{1}\%$ of which is a group of 197. A similar consideration for Israel's population (including the West bank and Gaza Strip) reduced the required MTUF group size to affect Israel alone to approximately 122.

#### DEPENDENT VARIABLES

Upon arrival in Israel, the authors met with Israeli scientists to further reduce the list of dependent variables proposed earlier. The following list represents all of the daily time series data publicly available at the end of the research period, when the authors departed from Israel.

### Individual Variables

Jerusalem

1. Crime: total crimes per day, obtained from the Social Research Division of the Israel Police Department.
2. Auto accidents: total number per day involving personal injury, obtained from the Municipal Government of Jerusalem.

3. Fires: total number of events to which the Fire Extinguishing Service responded per day, obtained from the Jerusalem District Fire Extinguishing Service.

Israel

4. Crime: total crimes per day for Israel, excluding Jerusalem, obtained from the Israel Police Department.
5. Stock market: Tel Aviv Stock Exchange daily index of freely traded stocks, excluding stocks of commercial banks (whose prices were artificially supported by the banks).
6. National mood: affective tone of the most prominent story (picture story of the front page) in the *Jerusalem Post* each day. The scale ranges from 1 (very negative, unpleasant) to 7 (very positive, up-lifting). Scoring was blind and used the average score of two independent raters (Israeli college students).

Lebanon

7. War deaths: total number per day of military and civilian deaths (all factions) due to the Lebanese conflict, as reported in the major Israeli newspapers (*Jerusalem Post* and *Ha Aretz*) as well as by the *International Herald Tribune* and BBC World Service reports. The natural logarithm of reported war deaths was used to make the series stationary with regard to variance.
8. War intensity scale: a content analysis scaling of the intensity of the hostilities in Lebanon each day as reported in news stories in the *Jerusalem Post*. This five-point scale was based on the content scale categories developed by Azar (1980): 0 (no reported fighting) to 4 (full-scale land battles, etc.). The rating was blind with respect to the dates of events, and the analysis used the mean of three independent raters.

The dates of actual occurrence of events for both the war intensity scale and war deaths were used in the time series analyses. The date of occurrence was usually the day before the event appeared in the newspaper, and in some cases a week or more passed before information on the conflict became available in the news. Reported war deaths and the war intensity scale were correlated with each other, $r = .71$. Further details on the variables and data sources are available from the authors.

## Composite Indices

In addition to analyzing each variable individually, composite indices were formed for Jerusalem (JERCOM), Israel (ISRCOM), and Lebanon (LEBCOM) as the arithmetic mean of the standardized ($z$-transformed) variables representing each locale, as described above. The construction of these separate indices was necessary in order to

study possible distance effects, the hypothesis being that the effect would cover increasingly wide distances as a function of group size. The individual variables composing the standardized scales were inverted when necessary, so that a positive deflection in an index always indicated a positive change in quality of life, that is, decreased auto accidents, fires, crimes, war deaths, and war intensity, and improved national mood and stock market. All of the composite indices were standardized daily series, 61 days in length with a mean of zero and a standard deviation of 1. On days for which there were missing data, the composite indices reflected the mean of all available data.

Cross-correlation analysis revealed that JERCOM and ISRCOM were not independent due to a significant correlation at lag 0 ($r = .50, p < .001$) between crime in Jerusalem and crime in the rest of Israel when the influence of weekends and other forms of nonstationarity were removed by prewhitening. Therefore, two additional uncorrelated composite indices were studied: JERCOM2, consisting of fires and auto accidents for Jerusalem; and ISRCOM2, consisting of crime for all Israel (including Jerusalem), stock market, and national mood. In addition to the above composite indices representing each separate locale, a global Overall Composite Index was computed as the daily arithmetic mean of six standardized ($z$-transformed) variables: war intensity scale, automobile accidents, fires, stock market, total crime (all Israel, including Jerusalem), and national mood. Because the war intensity scale and reported war deaths were highly correlated, only the more stationary of the two (war intensity) was used in the Overall Composite Index. As before, the sign given to each variable was such that positive numbers represented positive change in society.

A Variability Index was also computed as a measure of the variation each day among the six dependent variables in the Overall Composite Index. It was constructed by calculating the standard deviation among the six $z$-transformed variables for each day, thus creating a time series of between-variable variability. The scale was then standardized ($z$-transformed) so that an increase on the index reflected an increase in variability among measures. The Overall Composite Index and Variability Index taken together were expected to provide a broad-based operational definition of "coherence" in society. As coherence increases in the collective consciousness underlying society, the scores of the separate indicators should uniformly converge in a positive direction—that is, the composite score should increase and variability should decrease. In contrast, when coherence is low, the separate measures

should display greater variability and generally be less positive, reacting more independently to the complex forces that ordinarily influence their separate behaviors.

## TIME SERIES ANALYSES

All individual variables and composite indices were analyzed by two Box-Jenkins ARIMA time series methodologies: (a) impact assessment analysis to study the shape of the function and to explore the possibility of distance effects, and (b) transfer functions to address the question of causality (Box and Jenkins, 1976; McCleary and Hay, 1980).

### Impact Assessment Analysis

ARIMA models provide estimates of the linear relationships between variables. However, the present test of collective consciousness assumes a nonlinear effect because the linear term in equation 1 was held constant over the experiment, whereas the quadratic component (MTUF group size) varied. In order to estimate the slope of the function (whether linear or nonlinear) between the MTUF group size and the dependent series, impact assessment was used with multiple independent binary variables representing the different quartiles in the range of MTUF group size. This approach allowed visual inspection of the general shape of the function without making an a priori assumption that it was quadratic.

The complete ARIMA compound intervention model consisted of the following: the noise component ($N_t$); a constant term ($b_0$) representing the 15 days when the TM-Sidhi group size was smallest (65 to 124); and three binary independent variables representing ranges in MTUF group size of 125-157 ($I_{0t}$), 158-179 ($I_{1t}$), and 180-241 ($I_{2t}$), for 15, 15, and 16 days, respectively. The compound intervention model was thus:

$$Y_t = \omega_0 I_{0t} + \omega_1 I_{1t} + \omega_2 I_{2t} + N_t + b_0, \quad (2)$$

where $Y_t$ represents the level of the dependent variable at time t, and $\omega_0$, $\omega_1$, and $\omega_2$ are the parameter estimates for the impact of the respective independent variables, which are zero when the associated binary independent variables ($I_{0t}$, $I_{1t}$, $I_{2t}$) are 0, and are their full values when the

associated independent variables are 1. The variables $I_0$, $I_1$, and $I_2$ were modeled as zero-order transfer functions, that is, as abrupt, permanent changes, in effect whenever there was a pulse of 1 (McCleary and Hay, 1980) because there was no theoretical motivation for assuming delayed onset or a temporary effect.

Such ARIMA models were fitted for all individual variables and composite indices except for stock market and national mood; time series analysis was not appropriate for these two because of missing data points for weekends and several holidays when the stock exchange was closed and the *Jerusalem Post* was not published. The potential influence of holidays on the composite indices was controlled by including an additional binary independent variable for the Jewish High Holidays (September 8, 1983, for Rosh Hashanah; September 17, 1983, for Yom Kippur). The effect of maximum daily temperature on each composite index was also studied using transfer function methodology. The standard ARIMA iterative procedure for identification, estimation, and diagnosis of the model for each variable was followed (Box and Jenkins, 1976; McLeary and Hay, 1980).

## Cross-Correlations and Transfer Functions

In order to test the hypothesis that variations in the MTUF group size caused change in the dependent variables, cross-correlations and transfer functions were analyzed using MTUF group size as the input series or causer series, and the six individual variables and four composite variables (JERCOM, ISRCOM, LEBCOM, and Overall Composite Index) as output series. The model-building strategy and diagnostic procedures of McCleary and Hay (1980: 251) were followed. Identification of possible transfer function components involves filtering the dependent variable on the noise model for the MTUF as the input series and studying the cross-correlation function (CCF) between the residuals of the filtering and prewhitened MTUF as the input series. The hypothesis that the MTUF caused change in a dependent variable would be supported if change in the MTUF group size was followed within a reasonable lag by significant cross-correlation change in the dependent variable in the predicted direction, and if the dependent variable did not lead change in the MTUF. All analyses were done using the BMDP 2T program on a VAX 11/780 computer. All the hypotheses are directional, and the *p*-values are for one-tailed tests.

## RESULTS AND DISCUSSION

Figure 1 displays variations in MTUF group size over the course of the experiment, and shows the four quartiles of MTUF group size as event traces on the lower part of the figure. It can be seen that, in response to the call for the project, the level of participation rose gradually over the first two weeks, remained high for the next 13 days, during which a special course was offered to attract more participants, and then rose on weekends and fell during the week for the remainder of the project. The four quartiles of group size were irregularly distributed over the experiment, and their autocorrelation functions indicated that each had a virtually random temporal distribution, offering some protection to the internal validity of the experiment (Campbell and Stanley, 1963).

Figure 2 shows an inverse correlation between the MTUF group size and the Lebanon war intensity scale ($r = -.48$), and Figure 3 shows a positive correlation ($r = .57$) between the MTUF and the Overall Composite Index. Plots of the other variables (obtainable from the authors) also indicate change in the predicted direction, that is, negative variables (auto accidents, fires, crime in Jerusalem, crime in Israel, and war deaths) show an inverse correlation with the MTUF size, while the positive variables (stock market, national mood, and composite indices) show a positive correlation.

### IMPACT ASSESSMENT AND TRANSFER FUNCTIONS

#### Individual Variables

For each variable presented below, the impact assessment results are presented first, followed by the cross-correlations and transfer functions. The name of each dependent variable is followed by its noise model (MA for moving average and AR for autoregressive), and the $t$ statistics associated with each model component. For each variable, all noise model estimates were statistically significant, the noise components lay within the bounds of stationarity-invertibility, and the transfer function parameters lay within the bounds of system stability. The MTUF noise model used in the identification procedure of transfer function components was seven-day seasonal differencing, with first- and seventh-order autoregressive components (AR1 and 7). The Ljung-

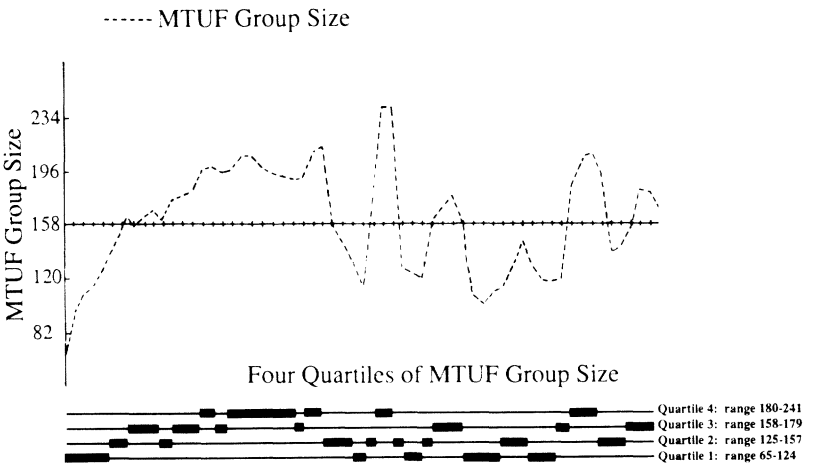


**Figure 1: Variations in the Size of the MTUF Group. This figure shows the variations in the size of the MTUF over the course of the experiment from August 1 to September 30, 1983. Below the graph are lines with event marks indicating the temporal distributions of the four different quartile ranges of group size.**

Box Q statistic (hereafter referred to as the LBQ; Ljung and Box, 1976) indicated that the residuals of the model did not have an above-chance autocorrelation structure at 36 lags, LBQ(36) = 26; thus the model was statistically adequate.

*War intensity scale.* Impact assessment noise model: ARI, $t(55) = 5.52$. Impact assessment analysis estimated that the level of fighting during the first (lowest) quartile of group size was 2.96 scale points (i.e., prolonged artillery exchanges, medium-scale troop engagements, etc.). During the fourth (largest) quartile of MTUF group size, the war intensity in Lebanon was 1.76 on the scale (light fighting), indicating an estimated 45% decrease in war intensity; $t(55) = 2.71$, $p = .0045$. The impact assessment model passed all of the diagnostics for statistical adequacy; LBQ(36) = 29. There were no significant spikes in the autocorrelation function (ACF) or partial autocorrelation function (PACF), and a plot of the residuals appeared stationary with regard to level and variance.

Transfer function noise model: MA 4, $t(45) = -2.95$. As anticipated, there was no evidence in the cross-correlation function (CCF) that the war intensity scale led the MTUF series. There was a simultaneous correlation at lag 0 between the MTUF and war intensity, and the

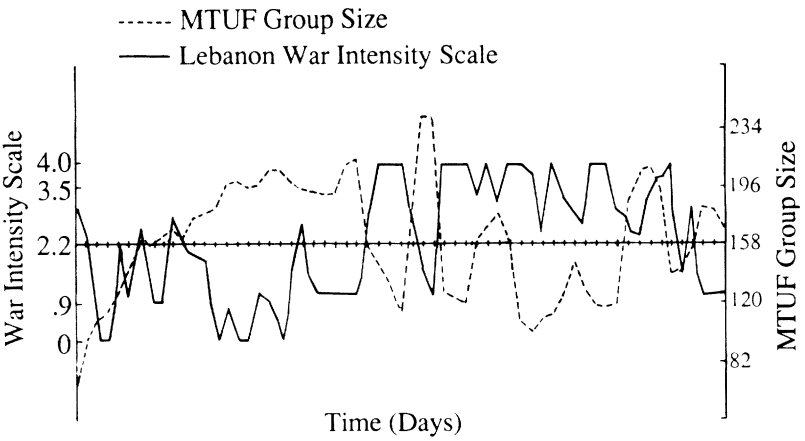


**Figure 2: Standardized Daily Time Series of the MTUF and the Lebanon War Intensity Scale. These graphs show a tendency toward an inverse correlation between the MTUF group size and the war intensity in Lebanon (r = −.48).**

MTUF led the war intensity scale at lag 10. These were both significant as transfer function components, which indicated reductions in war intensity of 34%, $p = .0001$, at lag 0, and 15.5%, $p = .015$, at lag 10 (see Table 1). Diagnostics indicated that model residuals were white noise; LBQ(36) = 27 with no significant spikes in the ACF or PACF, and a plot of the residuals appeared stationary with regard to level and variance. Transfer function diagnosis revealed that the model residuals were uncorrelated with the prewhitened MTUF causal variable (no significant $r$'s in the CCF to 12 lags), indicating a statistically adequate model. The significance of the transfer function components was robust with respect to different specifications of the war intensity scale noise model and different specifications of the MTUF noise model used in the identification procedure of the transfer function components. The 49.5% reduction estimated by the transfer function method (lags 0 and 10 combined) is quite similar to the 45% reduction in war intensity estimated by the impact assessment method. For the rest of the dependent variables reported below, all the impact assessment and transfer function models also passed all these diagnostic tests, but for brevity, only the LBQ will be reported.

*War deaths.* Impact assessment noise model: AR1, $t(55) = 6.06$. Impact assessment analysis showed that deaths in Lebanon decreased 1.38 log units, corresponding to a 75.9% drop from a mean of 40.1

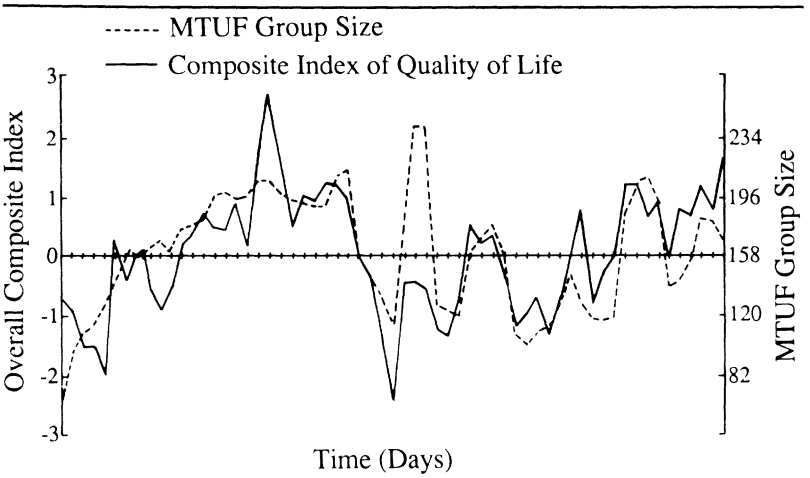


**Figure 3: Standardized Daily Time Series of the Overall Composite Index Plotted Against the MTUF. An Overall Composite Index composed of six variables was constructed so that a positive deflection on the graph represents global improvement in quality of life. It can be seen that the index showed a positive correlation with the MTUF (r = .57).**

deaths per day in the first quartile, to 9.7 per day in the fourth quartile; $t(55) = -2.12$, $p = .019$, LBQ (36) = 39 (see McCleary and Hay, 1980: 174, on conversion of log intervention parameters to percent change).

Transfer function noise model: AR1, $t(52) = 6.46$. The CCF showed significant spikes at lags O and 5, with the MTUF leading the war deaths, and there was no indication that the war death series led the MTUF series. Transfer function analysis estimated that at lag 0, war deaths decreased by 56.6%, $p = .0004$, from the mean of 24.5 deaths per day and decreased an additional 26.6%, $p = .08$ (trend), at lag 5 (Table 1), LBQ(36) = 42. This combined 83.2% decrease estimated for the two transfer function components is of similar magnitude to the estimated 75.9% decrease estimated by impact assessment analysis.

*Crime in Israel.* Impact assessment noise model: AR5, $t(48) = 10.84$; AR7, $t(48) = 16.53$. Crime rate in Israel decreased an estimated 12.1%, from a baseline of 607.8 per day during the first quartile, to 534.5 per day during the third quartile; $t(48) = -3.10$, $p = .0016$, LBQ(36) = 43. Change was in the predicted direction but did not reach significance in the fourth quartile.

Transfer function noise model: AR5, $t(44) = 7.02$; AR7, $t(44) = 9.13$. The CCF suggests that the MTUF led reduction of crime in Israel the

TABLE 1
Cross Correlations and Transfer Functions of the MTUF (Input) and Individual Variables (Output)

| *Variable* | *rCCF** | *Lag* | *Transfer Functions* | | |
|---|---|---|---|---|---|
| | | | *Estimate*** % | *t (df)* | *p*[a] |
| War intensity | −.24 | 0 | −34.0 | −4.91 (45) | .0001 |
| | −.26 | 10 | −15.5 | −2.28 (45) | .015 |
| War death (log) | −.42 | 0 | −56.6 | −3.58 (52) | .0004 |
| | −.35 | 5 | −26.6 | −1.39 (52) | .08 |
| Crime–Israel | −.33 | 1 | | | n.s. |
| | −.48 | 6 | −4.1 | −2.07 (44) | .022 |
| Crime–Jerusalem | −.32 | 1 | | | n.s. |
| | −.50 | 6 | −7.4 | −2.06 (45) | .023 |
| Fires | −.35 | 4 | | | n.s. |
| | −.34 | − 1 | | | n.s. |
| Auto accidents | −.36 | 6 | −7.8 | −1.09 (52) | .14 |

a. One-tailed.
*Standard errors = .15 to .16; **units are % change from the mean of series.

next day and six days later. However, transfer function analysis indicated that only the lag 6 component was significant; thus the lag 1 component was dropped from the model (Table 1). Crime was estimated to decrease 4.1% (22 fewer crimes per day), $p = .022$. The model was adequate (LBQ(36) = 40) and robust, and there was no evidence of crime in Israel leading MTUF. A zero-order spike appeared in transfer function diagnosis, but it was not significant when entered as a component in the transfer function model.

*Crime in Jerusalem.* Impact assessment noise model: AR1, $t(48) = 1.80$, and AR7, $t(48) = 2.58$. Crime in Jerusalem declined 8.8%, from a mean of 46.69 crimes per day during the first quartile to 42.60 during the fourth quartile, but this decrease was not statistically significant.

Transfer function noise model: AR7, $t(45) = 3.30$. Like crime in Israel, the CCF indicated that the MTUF led decrease of crime in Jerusalem at lag 1 and lag 6 (Table 1), but the tentative transfer function indicated that the lag 1 component was only marginally significant, $t(43) = -1.21$, $p = .11$, and it was dropped from the model. The final transfer function indicated a decrease in crime by 7.4% at lag 6 from the mean level of 46.4

crimes, $p = .023$. The model was adequate (LBQ(36) = 26) and robust, and there was no evidence of crime in Jerusalem leading the MTUF.

*Fires.* Impact assessment noise model: AR1, $t(55) = 2.52$. Fires decreased an estimated 30.4%, from 8.09 per day during the first quartile, to 5.63 per day during the fourth quartile; $t(55) = 1.70$, $p = .045$, LBQ(36) = 24.

Transfer function noise model: AR1, $t(57) = 2.55$. The CCF shows a significant spike at lag 4 with the MTUF leading reduction in fires, but it was not significant as a transfer function component (Table 1). There was also a significant spike in the opposite direction with fires leading the MTUF by one lag, but this did not prove to be significant as a transfer function component, indicating that fires did not significantly lead the MTUF. The MTUF did make a marginally significant contribution as a transfer function component to fires at lag 0, associated with a 10.8% reduction from the mean of 616 fires per day, $t(57) = -1.32$, $p = .1$ (trend).

*Auto accidents.* Impact assessment noise model: MA 8, $t(56) = 2.46$. The auto accidents series was virtually white noise without prewhitening. There were no significant spikes in the ACF, LBQ(36) = 27, or PACF, although there was one near significant spike at lag 8, which was significant when estimated, as indicated in the noise model above. Auto accidents decreased 34.4%, from 3.88 per day during the first quartile to 2.54 per day in the third quartile; $t(56) = -2.03$, $p = .024$, LBQ(36) = 22. Change was in the predicted direction but did not reach significance during the fourth quartile.

Transfer function noise model: MA 8, $t(55) = 2.28$. The cross-correlation of the unprewhitened auto accident series with the residuals of the MTUF model provided a single significant spike at lag 6 (Table 1). Prewhitening the auto accidents series with an MA 8 also gave a similar cross-correlation at lag 6 with the prewhitened MTUF, $r = -.312$, *s.e.* = .16, suggesting that increases in the MTUF resulted in decreased auto accidents six days later. The transfer function showed that the decrease in auto accidents associated with the MTUF at lag 6 was 7.8% from the mean of 3.0 auto accidents per day, $t(52) = -1.09$, $p = .14$ (trend).

Thus, for most individual variables, the two methods of analysis, transfer functions and impact assessment, yielded consistent results. In support of the experimental hypotheses, all outcomes proved significant on at least one of the two methods of assessment. The transfer functions indicate that change in the MTUF was followed by change in the predicted direction in the individual variables, suggesting a causal

relationship. This causal hypothesis is further supported by analysis of the composite indices. The relatively stronger performance of the war-related variables, compared to the other separate variables (crimes, fires, and auto accidents), which are more direct reflections of individual behavior, is consistent with Maharishi's theoretical perspective that the leadership of government is more sensitive to changes in collective consciousness than are individual members of society (1977: 122; 1986a: 10-14). The intensity of the conflict in Lebanon is presumably largely under the control of governments and large military organizations. Caution should be taken, however, in interpreting differences between the different ARIMA models for different variables because the estimate of the impact may depend upon specific characteristics of the variable, such as the magnitude of the standard error, the population size represented by the variable, as well as its sensitivity to the effect.

## Composite Indices

The results of impact assessment analysis of the composite indices are shown in Table 2a-e. The constant terms in Table 2 show the level of variables during the first quartile relative to the zero mean of the standardized series, and are negative (except for the variability index for which a constant 1 was added to the series because without it the constant was too close to zero to permit estimation). The binary variables $I_0$, $I_1$, and $I_2$, represent the second, third, and fourth quartiles of MTUF size, respectively as defined earlier in equation 2 and illustrated in Figure 1. The results of the High Holidays binary variable in each of the models is also shown in Table 2. During the High Holidays the quality-of-life indices increased for Jerusalem, Israel, and the Overall Composite Index, although there was also a nonsignificant increase in the hostilities in Lebanon on those days. Use of transfer function methodology indicated that, in most cases, adding the High Holidays component increased the statistical significance of the intervention components because it accounted for additional variance, thus reducing the standard error. Maximum daily temperature did not have a significant effect on any of the variables and therefore was not included in the final models.

*JERCOM.* According to impact assessment analysis, it can be seen in Table 2a that, compared to the first quartile, JERCOM increased by .99 standard deviations in the third quartile ($p$ = .0009) and .94 standard deviations in the fourth quartile ($p$ = .0031).

TABLE 2a-e
ARIMA Impact Assessment Results of Composite Indices

2a: Jerusalem Composite Index

| *Variable* | *Order* | *Estimate* | *t(55)* | *p* |
|---|---|---|---|---|
| JERCOM | MA 7 | −.41 | −3.07 | .0033 |
| JERCOM | Const. | −.70 | −2.97 | .0022 |
| $I_0$ | UP 0 | .63 | 2.22 | .0153 |
| $I_1$ | UP 0 | .99 | 3.29 | .0009 |
| $I_2$ | UP 0 | .94 | 2.85 | .0031 |
| High Holy Days | UP 0 | 1.67 | 3.01 | .0039 |

LBQ(12) = 12, n.s.; LBQ(36) = 32, n.s.

2b: Israel Composite Index

| *Variable* | *Order* | *Estimate* | *t(54)* | *p* |
|---|---|---|---|---|
| ISRCOM | AR 1 | .36 | 2.65 | .0105 |
| ISRCOM | Const. | −.95 | −3.68 | .0003 |
| $I_0$ | UP 0 | .89 | 3.01 | .0020 |
| $I_1$ | UP 0 | 1.31 | 3.94 | .0001 |
| $I_2$ | UP 0 | 1.38 | 4.00 | .0001 |
| High Holy Days | UP 0 | 2.03 | 4.11 | .0001 |

LBQ(12) = 12, n.s.; LBQ(36) = 32, n.s.

2c: Lebanon Composite Index

| *Variable* | *Order* | *Estimate* | *t(54)* | *p* |
|---|---|---|---|---|
| LEBCOM | AR 1 | .65 | 6.12 | .0001 |
| LEBCOM | Const. | −.32 | −.93 | n.s. |
| $I_0$ | UP 0 | .12 | .44 | n.s. |
| $I_1$ | UP 0 | .43 | 1.29 | n.s. |
| $I_2$ | UP 0 | .75 | 2.07 | .0216 |
| High Holy Days | UP 0 | −.46 | −1.10 | n.s. |

LBQ(12) = 15, n.s.; LBQ(36) = 42, n.s.

2d: Overall Composite Index

| *Variable* | *Order* | *Estimate* | *t(54)* | *p* |
|---|---|---|---|---|
| Overall Composite | AR 1 | .27 | 1.99 | .0517 |
| Overall Composite | Const. | −1.09 | −4.17 | < .0001 |

*(continued)*

TABLE 2a-e Continued

| *Variable* | *Order* | *Estimate* | *t(54)* | *p* |
|---|---|---|---|---|
| $I_0$ | UP 0 | 1.03 | 3.57 | .0004 |
| $I_1$ | UP 0 | 1.59 | 5.04 | < .0001 |
| $I_2$ | UP 0 | 1.69 | 5.15 | < .0001 |
| High Holy Days | UP 0 | 1.20 | 2.46 | .0171 |

LBQ(12) = 8.7, n.s.; LBQ(36) = 35, n.s.

2e: Variability Index

| *Variable* | *Order* | *Estimate* | *t(54)* | *p* |
|---|---|---|---|---|
| Variability Index* | AR 1 | −.25 | 1.79 | .0791 |
| Variability Index | Const. | −.40 | 1.41 | n.s. |
| $I_0$ | UP 0 | −.99 | 2.81 | .0035 |
| $I_1$ | UP 0 | −.50 | 1.33 | n.s. |
| $I_2$ | UP 0 | −.96 | 2.50 | .0078 |
| High Holy Days | UP 0 | 1.28 | −2.08 | .0423 |

LBQ(12) = 9.5, n.s.; LBQ(36) = 34, n.s.
*ARIMA was done on Variability Index + 1.

Transfer function noise model: AR7, $t(42) = 3.36$. A significant MTUF transfer function component was found at lag 6 ($p = .05$), associated with an estimated .25 standard deviation increase in JERCOM with a nonsignificant lag 9 component, LBQ(36) = 29 (Table 3). When the lag 9 component was dropped, the lag 6 component was only marginally significant, $t(46) = 1.23$, $p = .1$ (trend). There was no evidence in the CCFs of JERCOM leading the MTUF.

*ISRCOM.* Table 2b shows an estimated 1.38 standard deviation increase in ISRCOM during the fourth quartile as compared to the first quartile ($p < .0001$).

Transfer function noise model: AR1, $t(44) = 2.8$; AR7, $t(44) = 3.24$. The CCF showed that MTUF led the Israel composite index at lags 1 and 6; there was no indication that ISRCOM led the MTUF. Table 3 shows that the transfer function components for lags 1 and 6 were .49, $p = .004$, and .30, $p = .018$, respectively, which represented a combined .79 standard deviation increase in the quality-of-life index for Israel, LBQ(36) = 38. Comparable results were found for ISRCOM2 (which also had a noise model of AR orders 1 and 7); lag 1 estimate = .5 *S.D.*, $t(44) = 2.94$, $p = .003$; lag 6 estimate = .31 *S.D.*, $t(44) = 2.27$, $p = 0.14$.

TABLE 3
Cross Correlations and Transfer Functions of
MTUF (Input) and Composite Indices (Output)

| | | | *Transfer Functions* | | |
|---|---|---|---|---|---|
| *Variable* | *rCCF** | *Lag* | *Estimate*** | *t (df)* | *p*[a] |
| JERCOM | .31 | 6 | .25 | 1.68 (42) | .05 |
| | .38 | 9 | | | n.s. |
| ISRCOM | .34 | 1 | .49 | 2.79 (44) | .004 |
| | .42 | 6 | .30 | 2.16 (44) | .018 |
| LEBCOM | .41 | 0 | .44 | 3.45 (52) | .0006 |
| | .46 | 5 | .25 | 1.94 (52) | .029 |
| Overall | .22 | 1 | .34 | 2.18 (51) | .018 |
| | .23 | 6 | .24 | 1.8 (51) | .038 |

a. One-tailed.
*Standard errors = .15 to .16; **units are standard deviations.

*LEBCOM.* Table 2c indicates an estimated .75 standard deviation improvement in LEBCOM in the fourth quartile relative to the first quartile, $p = .0216$.

Transfer function noise model: AR1, $t(52) = 5.20$. The CCF and transfer function analysis showed that the MTUF noise model identified lags 0 and 5 components, which they consistently did. The magnitude of changes estimated for the lags 0 and 5 transfer function components were .44, $p = .0006$, and .25, $p = .029$, standard deviations, respectively (Table 3). The model was statistically adequate, LBQ(36) = 40. A lag 10 component was in the predicted direction but did not reach significance. The improvement of .69 standard deviations estimated by the two transfer function components combined was comparable to the .75 standard deviation improvement estimated by the impact assessment method.

*Overall Composite Index.* Table 2d shows estimated 1.03, 1.59, and 1.69 standard deviation increases in the overall quality of life during the second, third, and fourth quartiles, respectively, compared to the first quartile; all three were highly statistically significant, especially the third and fourth quartiles ($p$'s $< .0001$).

Transfer function noise model: AR1, $t(51) = 2.15$. The transfer function estimates indicated increases by .34, $p = .018$, and .24, $p = .038$, standard deviations in the overall quality of life at lags 1 and 6,

respectively, for a combined influence of .58 standard deviations (Table 3). The model was statistically adequate, LBQ(36) = 36, and there were no significant spikes in the CCF of the transfer function diagnostics.

Table 2e presents data on the Variability index, supporting the hypothesis that when the quality of life increased as shown by the Overall Composite Index, the variability between variables decreased. Compared to the first quartile, there was a significant decrease of .99, $p$ = .0035, and .96, $p$ = .0078 standard deviations in the Variability index during the second and fourth quartiles, respectively. Variability actually increased during the High Holidays, perhaps reflecting a positive change in quality of life in Israel together with a negative flare-up in the Lebanon war. Figures 4a-d show that the different versions of the composite indices (e.g., JERCOM and JERCOM2), including those that add a High Holidays component to the model (e.g., JERCOM HH), yielded similar results. It can also be seen in Figures 4a-b that for the Jerusalem and Israel composite indices, the effect leveled off at the largest MTUF quartile, while Figure 4c shows that the effect accelerated in the fourth quartile for the Lebanon composite index. The similarity of functions for Jerusalem and Israel, along with the finding of a significant cross-correlation between levels of crime in Jerusalem and Israel, suggests that Jerusalem and Israel may form a single, inseparable system with regard to collective consciousness.

For the Jerusalem and Israel composite indices, the effect reached significance by the second quartile, when the group size lay between 125-157 (Tables 2a-b), whereas for the Lebanon composite index, the effect did not reach significance until the fourth quartile, when the group reached 180-241 (Table 2c). These results provide general support for the prediction made from equation 1 that Israel would be affected by a group size of 122 or more, whereas Lebanon would not be affected until the group size exceeded 197. Such distance effects were also indicated by previous research in which the quality of life improved within the "1% cities" and not in the control cities (Borland and Landrith, 1976; Dillbeck et al., 1981), and by studies showing effects within the specific area where TM-Sidhi groups were located but not in other areas (e.g., Dillbeck et al., 1987; Orme-Johnson, Gelderloos, and Dillbeck, in press). The exact nature of the relation of the effect to distance, however, must await further experimental clarification.

The results of the impact assessment and transfer function analyses show that combining variables into composite indices generally resulted in more clear-cut effects, especially of the overall index. This pattern

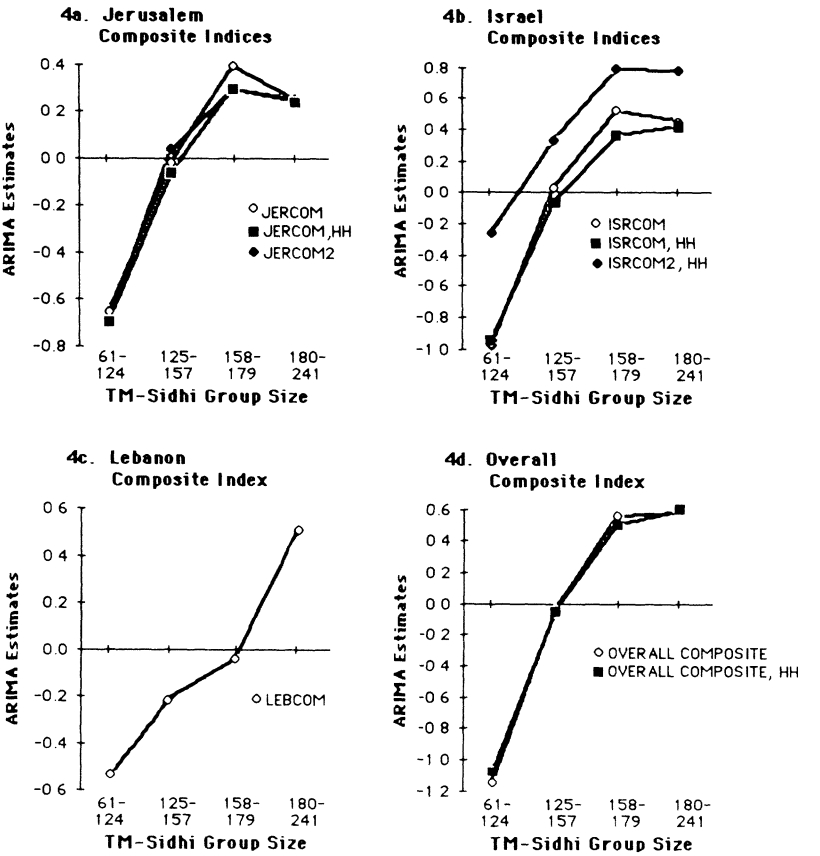


Figure 4a-4d: ARIMA Impact Assessment Estimates for the Four Quartiles of the MTUF for the Composite Indices. ARIMA estimates for all composite indices increased at higher MTUF quartiles. The ARIMA estimates that included the High Holidays (indicated in the figure legends by HH) are only plotted for those variables for which the High Holidays variables had a significant effect. The High Holidays did not account the relation of any variable with the MTUF. Also, it can be seen that the plots are very similar for the two versions of the Jerusalem Composite Index and for the two versions of the Israel Composite Index.

would be expected if the MTUF produced a global effect influencing all variables, because adding the variables together would then enhance the signal-to-noise ratio.

## EVIDENCE OF CAUSALITY

Since MTUF group size was not completely under experimenter control, it was not a fully randomized variable. Nevertheless, when the MTUF was broken into quartiles, the 15 (or 16) days representing each quartile were found to be essentially randomly distributed over the duration of the experiment. The general finding of increased ARIMA impact for the larger quartiles supports a causal interpretation because it is unlikely that an unknown variable(s) would follow that same random time course as the distribution of group sizes reflected in the different quartiles. In addition, all significant seasonal components such as "weekend effects," drifts, and trends in the dependent variables, were explicitly removed by the ARIMA noise models, and the effects of holidays and temperature were explicitly controlled. Further, in controlling for the prior history of each of the dependent variable series, the noise component of the model is said to implicitly control for systematic influence of exogenous variables reflected in the behavior of the outcome series not specified in the impact assessment component of the model (Box and Jenkins, 1976; Vandaele, 1983).

Perhaps even stronger support for a causal interpretation is provided by cross-correlation and transfer function analyses that showed none of the dependent variables led the MTUF, whereas there was consistent evidence of the opposite. A lag 0 cross-correlation was observed between the war-related variables and the MTUF. This latter finding is consistent with the original prediction of a sudden and systemwide phase transition to decreased regional violence when the MTUF was practiced by a sufficiently large group. A possible alternative explanation—that knowledge of the war had an immediate influence on level of group participation—is unlikely for several reasons. First, conflict events in Lebanon were almost always reported in the newspapers the day after they occurred, whereas the date of occurrence was used in the time series analysis. Therefore, the lag 0 effect indicated by the transfer function took place the day before the course participants would have known about it through the newspaper. This makes it unlikely that news accounts of the war were motivating participation in the project. Furthermore, participants came from all over Israel, usually for a week or more at a time or on the weekend, and the number of "drop ins" from the immediate Jerusalem area was quite small. Thus it also does not appear that hearing news reports over the radio immediately stimulated large numbers to participate in the project.

During the 13-day "experiment within an experiment," August 15-27, group size was experimentally raised to a high level (mean of 197.1) according to a preassigned schedule independent of the ongoing level of fighting. Nevertheless, the average number of war deaths per day during this experimental period was 1.5, compared with a mean of 33.7 for the 13-day periods immediately preceding and following the high MTUF period. The mean war intensity of .9 during the high MTUF period was also much lower than the average of 2.7 during the immediately prior and subsequent 13-day periods. Also, other variables consistently indicated a markedly higher quality of life during the high MTUF period.

Even if news of the war had been motivating individuals to participate in the project, it would not explain the consistent leading relationship of the MTUF to the wide variety of other variables, including the statistically independent composite indices (i.e., not correlated with level of fighting). That several uncorrelated variables could all be correlated with the MTUF is possible because the MTUF only accounted for some of the variance in each variable. Further, records maintained by the experimenters indicate that no subjects had to leave the course because of being immediately "called up" for military service in response to escalation of fighting. Hence the correspondence between a higher level of fighting and a smaller group size cannot be attributed to that cause.

The length of the lag between change in the MTUF and the change in the dependent variables also needs to be considered. Whether the effects manifested immediately or evolved more slowly appeared to depend on the nature of the system. In the case of the Lebanese conflict, the apparent delayed effects (at lags 5 and 10) could also have resulted from a direct positive influence that became observable only after steps were taken by policymakers over a period of several days.

## A FIELD-THEORETIC VIEW OF COLLECTIVE CONSCIOUSNESS

In this experiment, a very small group practicing this technology of consciousness in East Jerusalem appeared to influence overall quality of life in Jerusalem, Israel, and even in neighboring Lebanon. Such apparent action-at-a-distance and coherent amplification effects would

seem to require mediation through an underlying field characterized by or capable of interacting with consciousness. These findings are consistent with the prediction of Maharishi's Vedic Science that societal change can be initiated at a distance via an abstract field of collective consciousness (Maharishi, 1986a, 1986b; Orme-Johnson and Dillbeck, 1987). These data support the interpretation of an underlying unifying influence being produced on many diverse systems simultaneously. The stronger effects seen on the composite indices suggest this influence is common to—or adds "constructively" across—different outcome areas. The pattern of decreased variability along with an increase on the Overall Composite Index further indicates that when the group was large, diverse and ordinarily independent systems appeared to operate in a more integrated, "coherent" manner conducive to positive development for both the individual and society.

The war in Lebanon provides an especially critical test of the ability to neutralize tension and create coherent or constructive interaction among typically antagonistic groups in society. This longstanding crisis has resisted solution for the very reason that the involved parties are so factionated over ethnic, religious, socioeconomic, and political issues (Azar and Burton, 1986); the conflict is further exacerbated by being a focal point of larger regional and international conflict. Indeed, at the time of this study, Israeli forces were directly involved in the war. The apparent impact of the MTUF on reduction of conflict in Lebanon was highly significant (an estimated drop of 75% in war deaths when group size was large), suggesting that decreased stress and increased coherence in regional collective consciousness during high MTUF group periods may have diminished violent outbursts in Lebanon and facilitated more cooperative interaction among typically antagonistic factions. Nevertheless, because high MTUF impact periods were of short duration (from one to six continuous days) and took place over a single summer season, it may still be asked whether this effect can generalize to other times and places and be maintained over longer periods. Since completion of this study, reduction of armed conflict in Lebanon (including additional conflict areas in some cases) has been replicated in eight additional experiments utilizing the MTUF. In these studies, required group sizes were maintained from 1 to 10 weeks during all four seasons, with control periods lasting up to two years (Alexander, Nader et al., 1987; Davies et al., 1988; Orme-Johnson and Dillbeck, 1987: 227-231, 241-248). In each case, according to equation 1, experimental group size was sufficient to affect the war in Lebanon: Group sizes

varied from less than 100 meeting in the focal area of the conflict within Lebanon, to a group of over 7,000 assembling in the United States. The U.S. assembly (constituting $\sqrt{1}\%$ of the world's population) was also predicted and found to be associated with reduction of armed conflict on a global scale (e.g., in Nicaragua, Afghanistan), compared to immediately prior and subsequent periods and to the same period during the previous year (Orme-Johnson, Cavanaugh et al., in press). Further, experimental replications were obtained employing several different methods of assessing Lebanese conflict, including blind scoring of Lebanese news sources by Lebanese raters representing all major factions (Alexander, Nader et al., 1987), and retrospective application of Azar's (1980) independently scored Conflict and Peace Data Bank (Orme-Johnson, Alexander, Dillbeck, and Bousquet, in press).

There is clearly a need for a viable means to drastically reduce societal tension in order to resolve conflict without violence and thereby create a stable basis for progress and peace (White, 1984). We recognize that this proposed approach is highly novel and that to explain its apparent effects an entirely new field-theoretic orientation to international relations would be required. Nevertheless, given the acute need and the apparent failure of "policy irrelevance of available approaches to resolving enduring civil and international conflicts" (Blight, 1986, 1987), promising new methods must be examined very seriously. Given the findings of the current experiment and its subsequent replication, we suggest that an immediate priority for social scientists and policymakers would be to investigate the large-scale application of this simple and nonintrusive technology to resolving international conflicts over extended periods of time.

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