THE EFFECTS OF THE AGE OF ENLIGHTENMENT GOVERNOR TRAINING COURSES ON FIELD INDEPENDENCE, CREATIVITY, INTELLIGENCE, AND BEHAVIORAL FLEXIBILITY

DAVID W. ORME-JOHNSON, PH.D.; BARBARA GRANIERI, M.A.

Centre for the Study of Higher States of Consciousness, Maharishi European Research University, Weggis, Switzerland

Research completed May 1977

Controlled, longitudinal studies showed that field independence, creativity, intelligence, and behavioral flexibility are increased by Age of Enlightenment Governor Training Courses in which course participants learn and practice the "sidhis"—procedures in which natural and evolutionary desires are effortlessly projected from the deepest level of the mind to result in materialization at the level of experience and physiological performance. —EDITORS

A total of 398 subjects were tested during the first and last weeks of the Age of Enlightenment Governor Training Courses, advanced courses in the Transcendental Meditation program (3), held at Maharishi European Research University (MERU), during which they learned and practiced the procedures for performing the sidhis (for example, knowledge of the past and future, knowledge of other minds, and "passage through the sky" or "flying") (1). The necessary initial criterion for practicing the sidhis is the state of samadhi, or transcendental consciousness, whose behavioral and cognitive effects have been given a modern exposition by Maharishi Mahesh Yogi (3).

Four experiments were designed to assess the effects of the course on a variety of psychological dimensions: perception, creativity, intelligence, and cognitive and motor flexibility. All the experiments were of a similar design. Pairs of course participants equivalent in age, education, length of time participating in the Transcendental Meditation program and length of time as an instructor of Transcendental Meditation, were randomly assigned to one of two groups. One group was tested at the beginning and at the end of the six-month course and the other group was tested only at the end of the course to control for test familiarity effects. In the following summaries, improvement due to the course is reported if the following conditions were met:

(a) subjects pre- and posttested showed a significant improvement over the course (paired t),
(b) course participants tested only at the end of the course scored higher than their matched partners did on pretesting (unpaired t),
(c) the two group did not differ significantly from each other on posttesting (unpaired t).

Statistical significance was defined as p < .05, two-tailed, unless otherwise specified. On many of the tests a significant number of subjects scored high on the pretesting, creating a ceiling effect—the maximum value of performance the test was designed to measure was reached. Whenever percentile norms were available and the results were ambiguous due to a ceiling effect, two additional overlapping groups of subjects were selected for analysis, those who on pretesting scored under the 95th percentile and those who scored under the 90th percentile. An equal number of matched partners were selected as the second (posttest group only).

The Age of Enlightenment Governor Training Courses were found to produce (i) greater field independence (Embedded Figures Test), (ii) increased originality and fluency of visuo-spatial creativity (Torrance Test of Creative Thinking, Figural), (iii) increased intelligence (Raven's Progressive Matrices), and (iv) improved motor-cognitive flexibility and psychomotor speed (Test of Behavioral Rigidity).

FIELD INDEPENDENCE

The group Embedded Figures Test is a standard perceptual test that measures field independence—the ability to locate a simple figure embedded in a perceptually complex field (6, 7). A pilot study of 62 female subjects in June 1976, showed that at the beginning of the course over one third of the subjects solved 100% of the problems.
when tested under standard time conditions. Therefore, in order to eliminate a ceiling effect it was necessary to reduce the testing time by one half in the subsequent longitudinal study (2.5 minutes for section II or section III of the test, 9 problems in each section). A second group of female subjects (N = 126) was tested over the October 1976 to April 1977 course. Table 1 shows that the two groups were closely matched on all variables. Both the group tested before and after the course (N = 63) and the matched group tested only at the end of the course (N = 63) scored significantly better than the pretest subjects (p < .001, p < .1 respectively, two-tailed t-tests). The groups did not differ significantly from each other on posttesting (see Fig. 1).

FIG. 1. MEANS AND STANDARD DEVIATIONS FOR GROUP EMBEDDED FIGURES TEST. Course participants tested at the beginning of an Age of Enlightenment Governor Training Course improved significantly when retested at the end of the course. Course participants tested for the first time at the end of the course also scored significantly higher than the pretest subjects. These results indicate that the course improved field independence.

<p>| MATCHING OF SUBJECTS IN THE STUDY OF FIELD INDEPENDENCE |
|----------------|----------------|----------------|----------------|----------------|</p>
<table>
<thead>
<tr>
<th>AGES (YEARS)</th>
<th>YEARS OF COLLEGE</th>
<th>YEARS MEDITATING</th>
<th>YEARS A TM TEACHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course participants pre- and post-tested (N = 63)</td>
<td>M 27.0 6.3</td>
<td>M 3.2 1.5</td>
<td>M 1.5 1.6</td>
</tr>
<tr>
<td>Course participants posttested only (N = 63)</td>
<td>M 27.2 6.4</td>
<td>M 3.2 1.4</td>
<td>M 5.7 1.7</td>
</tr>
</tbody>
</table>

According to the test manual, section II and section III of the Group Embedded Figures Test are equivalent (section 1, a warm up, was always given first). In this experiment, the order of testing was counterbalanced, pre- and posttesting being in the order II–III for approximately half the subjects and III–II for the other half. However, an analysis of variance showed that the two forms were not equivalent (Form x Prepost Interaction, F = 16.18, df = 1.69, MSe = 1.81, p < .001). Therefore, in order to obtain a more precise estimate of the effect of the Age of Enlightenment Governor Training Course, only those posttest subjects who took the same form of the test as their partners on pretest were selected (29 prepost subjects and 29 posttest only subjects). This additional control gave even clearer results: both groups showed significant improvement on field independence after the course (see Fig. 2).

FIG. 2. BROAD COMPREHENSION AND IMPROVED ABILITY TO FOCUS ATTENTION RESULTING FROM THE AGE OF ENLIGHTENMENT GOVERNOR TRAINING COURSE. The Embedded Figures Test (EFT) is a standard perceptual test designed to measure field independence—the ability to locate a simple figure embedded in a perceptually complex field. Twenty-nine subjects given different forms of the test at the beginning and end of the Age of Enlightenment Governor Training Course were found to improve significantly on the EFT. During the course the subjects learned to practice the TM-Sidhi techniques. A second group of 29 course participants given the same form of the test as the pretest subjects and matched with them on age, education level, years practicing the Transcendental Meditation technique, and years teaching the Transcendental Meditation program were tested for the first time at the end of the course. They also scored significantly higher than the pretest group, showing that the improved performance was not due to familiarity with the test.

The average scores of the two groups at the end of the course were 105 and 115 percent greater than the maximum speed the test was designed to detect (the test had to be given in half the usual time to eliminate a "ceiling" effect). Seventeen percent of the subjects solved the problems in 200 percent of the maximum speed the test was designed to detect (9 problems in 2.5 minutes).
It was found that the mean rates of solving perceptual problems after the course for the two groups were 105% and 115% of the maximum speed the test was originally designed to detect. These levels of performance are beyond the established norms of the test. Ten subjects solved the problems at 200% of the maximum speed the test was originally designed to detect (they correctly answered all of the problems in half the standard time) and twenty-one subjects answered all but one problem in half the allotted time.

Research on the Embedded Figures Test has shown that higher scores reflect psychological differentiation, a deep-seated potential to discover and utilize more diversified resources to solve problems, greater creativity, and a reliance on one's own internal frame of reference in comprehending perceptual and social situations (6, 7).

The mechanics of achieving the sidhis is through a process technically called "sanyama." Sanyama is a process involving three aspects of consciousness: (1) "dharana," or the ability effortlessly to hold a thought in the focus of attention; (2) "dhyana," the capacity of thought to refine itself to its subtlest state; and (3) "samadhi" or unbounded awareness, the state of least excitation of consciousness. When unbounded awareness is maintained even when the attention is able to entertain a thought as it refines to its subtlest state, then the process of sanyama is said to be in operation. The Yoga Sutras of Patanjali specify specific formulas which, when subjected to the process of sanyama, result in the performance of sidhis. The purpose of sidhi performance is the integration of consciousness. While the actual performance of the sidhis is experienced within, and expressed in outer behavior, the wholeness of the state of samadhi, or transcendental consciousness, is simultaneously challenged and strengthened. The Embedded Figures test, by demanding (a) fixed attention to the hidden figure to be identified, (b) continuous scanning of the field, and (c) broad comprehension which is stable in the face of distracting detail, may be said to exercise all three components of sanyama—dharana or fixity, dhyana or motion, and samadhi or unbounded awareness. When the solution is achieved, both in the Embedded Figures Test and in the sanyama exercise, only the final component, samadhi, remains, with its characteristic feature of blissful fulfillment—the "Aha" or "Eureka" phenomenon. This experience, both in the case of successful problem-solving and in the case of sanyama practice, has been associated with synchronous EEG patterns indicative of resolution to a simple ordered psychophysiological state. It is thus to be expected that repeated experience of sanyama should be associated with improved performance on the Embedded Figures Test.

The results of the present experiment indicate that the practice of sanyama in the context of developing the higher abilities known as sidhis does in fact increase field independence as measured in the Embedded Figures Test and supports the view that dharana, dhyana, and samadhi are basic to field independent performance.

CREATIVITY

The Torrance Test of Creative Thinking, Figural, measures visuo-spatial creativity, the ability to generate new and useful visual ideas.

Thirty subjects (females) tested before and after the six-month Age of Enlightenment Governor Training Course on different forms of test (Form A and Form B) improved significantly on fluency, (the number of ideas generated) and originality, (the imaginativeness or statistical infrequency of the ideas) (see figure 3). Matched course participants (see Table 2 for matching data) tested only at the end of the course also scored higher than pretest subjects, indicating that the improvement in creativity was not due to test familiarity.

![Torrance Figural Test of Creative Thinking](image)

FIG. 3. INCREASED VISUO-SPATIAL CREATIVITY RESULTING FROM THE AGE OF ENLIGHTENMENT GOVERNOR TRAINING COURSES. Sixty subjects were given the figural form of the Torrance Test of Creative Thinking which measures visuo-spatial creativity. Thirty were tested on different forms of the test at the beginning and at the end of an Age of Enlightenment Governor Training Course during which they learned to practice the TM-Sidhi techniques. A matched group of thirty course participants was tested only at the end of the course. Both groups did better after the course than the group tested before the course on (a) Fluency (the frequency of creative ideas) and (b) Originality (the imaginativeness or statistical infrequencies of the ideas), indicating that increased creativity results from participating in the course and is not due to familiarity with the test.
of awareness. Stabilizing this through the process of sanyama can be expected to enhance creativity, a transcendental consciousness is the state of restful liveliness.

The universal prototype of these two basic types of thinking is the process of sanyama. During sanyama a thought is perceived as converging on its universal value, sequentially settling into the state of maximum integration of consciousness (transcendental consciousness), whereupon the divergent and striking effects of the sidhis emerge out of transcendental consciousness. The practice engenders in the mind and physiology the generalized habit of “converging” and “diverging” which is transferable to any specific situation as measured in these experiments on creativity and intelligence. The Vedic tradition states that once sanyama is mastered, the ability to accomplish anything is ingrained in the physiology:

“Consciousness is the field of all possibilities. It is the practice of transcending that prepares the fertile ground for sanyama.”

—Maharishi
BEHAVIORAL FLEXIBILITY

The Test of Behavioral Rigidity measures the ability to make conceptual and behavioral changes without previous habits inhibiting adjustment to changed conditions. Rigidity as measured by the test has been shown to increase as a function of aging while increased flexibility implies reversal of the aging process (4). Thirty-six course participants were measured at the beginning and end of the Age of Enlightenment Governor Training Course and thirty-six additional course participants matched with the first group were only tested at the end of the course (see Table 4 for matching data). This experiment was concerned with the objective sections of the test measuring flexibility of cognitive and motor performance under timed conditions.

Both subtest scores and composite scores were analyzed. On series 1, speed of thinking and writing antonyms, and series 2, synonyms, subjects improved significantly (see figure 5). Series 3 is a more complex text of flexibility requiring the application of a rule (synonyms if the stimulus word is capitalized and antonyms if the stimulus word is lower case). A significant improvement was found for course participants who initially scored under the 95th percentile (N = 13).

One of the major factors (derived by factor analysis) of the test is motor-cognitive rigidity, the ability to shift easily from one familiar task to another without interference. The two composite scores that contribute the most to motor-cognitive rigidity are derived from the series 1–3 subtests (Opposites -R1 and Opposites -R2). Course participants improved significantly on both these scores, showing an improvement in motor-cognitive flexibility.

### TABLE 3
MATCHING OF SUBJECTS IN THE STUDY OF INTELLIGENCE USING RAVEN'S PROGRESSIVE MATRICES

<table>
<thead>
<tr>
<th>MALES</th>
<th></th>
<th>AGEP (YEARS)</th>
<th>YEARS OF COLLEGE</th>
<th>YEARS Meditating</th>
<th>YEARS A TM TEACHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course participants</td>
<td></td>
<td>M</td>
<td>S.D.</td>
<td>M</td>
<td>S.D.</td>
</tr>
<tr>
<td>pre- and posttested (n = 40)</td>
<td>28.0 3.8</td>
<td>3.2 1.8</td>
<td>6.0 1.7</td>
<td>3.7 1.4</td>
<td></td>
</tr>
<tr>
<td>Course participants</td>
<td></td>
<td>M</td>
<td>S.D.</td>
<td>M</td>
<td>S.D.</td>
</tr>
<tr>
<td>posttested only (n = 40)</td>
<td>28.6 4.3</td>
<td>5.9 1.7</td>
<td>4.0 1.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 4
MATCHING OF SUBJECTS IN THE STUDY OF BEHAVIORAL RIGIDITY

<table>
<thead>
<tr>
<th>MALES</th>
<th></th>
<th>AGEP (YEARS)</th>
<th>YEARS OF COLLEGE</th>
<th>YEARS Meditating</th>
<th>YEARS A TM TEACHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course participants</td>
<td></td>
<td>M</td>
<td>S.D.</td>
<td>M</td>
<td>S.D.</td>
</tr>
<tr>
<td>pre- and posttested (n = 36)</td>
<td>27.1 4.1</td>
<td>3.4 1.7</td>
<td>5.6 1.8</td>
<td>3.3 1.7</td>
<td></td>
</tr>
<tr>
<td>Course participants</td>
<td></td>
<td>M</td>
<td>S.D.</td>
<td>M</td>
<td>S.D.</td>
</tr>
<tr>
<td>posttested only (n = 36)</td>
<td>27.2 4.6</td>
<td>3.4 1.7</td>
<td>5.6 1.8</td>
<td>3.8 1.6</td>
<td></td>
</tr>
</tbody>
</table>

Test of Behavioral Rigidity

![Graph showing increased mind-body coordination](image-url)
For Opposites –R1, the analysis was for all subjects who did not make a perfect score at the beginning of the course (N = 22). Pretest mean = 88.2, S.D. = 13.2, Posttest mean = 95.0, S.D. = 5.8, Second group, Posttest mean = 94.9, S.D. = 6.7.

For Opposites –R2, subjects under the 90th percentile on the pretest improved significantly. Pretest mean = 76.8, S.D. = 16.5, Posttest mean = 88.5, S.D. = 18.5, Second group mean = 89.5, S.D. = 20.3.

A second major factor measured by the test is psychomotor speed; a high score implying superior efficacy in coping with familiar situations requiring rapid response and quick thinking (4, p. 4). Course participants also improved significantly over the Age of Enlightenment Governor Training Course on the psychomotor speed factor (for the 24 subjects who originally scored under the 90th percentile, Pretest mean = 53.8, S.D. = 6.2, Posttest mean = 58.0, S.D. = 7.2, Second group, Posttest mean = 57.7, S.D. = 6.0).

These results show increased flexibility in dealing with restraints imposed by physical objects; increased psychomotor speed; increased flexibility in dealing with symbolic and semantic restraints; increased motor-cognitive flexibility.

Schaeie and Strother (5) have conducted studies on aging using the Behavioral Rigidity Test and have found that rigidity increases steadily as a function of increasing age. For example, on the psychomotor speed variable, performance decreases by 5 T-score points over the ten-year period from the ages of 26 to 36. The improvement of 4.2 T-score points over the six month period of the Age of Enlightenment Governor Training Course found in the present experiment implies a reversal of aging of approximately 8 years, a rate of negative aging, or getting younger, by a factor of 16.

By the end of the course, the mean flexibility score of the course participants was similar to that of normal individuals 5 to 10 years younger.

REFERENCES