AWARENESS AND COGNITION: THE ROLE OF AWARENESS TRAINING IN CHILD DEVELOPMENT

Tifrah Q. Warner
York University

This study examined the role of awareness in cognition and the impact of training of awareness. Two groups of children ages 5 to 11 were studied (N = 126). One group included children who received training of awareness in the form of either the Transcendental Meditation (TM) technique or Word of Wisdom, a related technique for children under 10 years of age (n = 60). The main variables were 2 mental capacities defined in terms of awareness, Working Memory and Attention, and Cognitive Competence, defined in terms of Piaget’s conservation tasks. Regression analyses found awareness capacities to significantly account for cognitive competence. Advanced cognitive performance was found associated with awareness training, and this performance was related to length of practice of the techniques for 4 out of 7 cognitive measures. Awareness is a construct that offers new conceptual and research avenues.

Perhaps the most dramatic phenomenon observed by child psychologists is the increase of mental competence during pre- and early school years. This is most markedly demonstrated in Piaget’s classical conservation tasks. We find 4-year olds believing that there are more checkers in a row that is spread out. Three or so years later, these children not only laugh at such a mistake, they are also not fooled into believing that the amount of juice increases when it is poured into a glass that is narrow and tall.

Currently, this interesting change in mental competence is examined predominantly within the Information Processing framework. Starting in the late 1960s and early 1970s, the growth of the child’s mental accomplishments has been related to the growth of capacities to take in and manipulate information (Atkinson & Shiffrin, 1968; Craik & Lockhart, 1972). Researchers are still struggling with the exact definitions and...
place of these mental capacities. Nevertheless, they share a consensus about what the main capacities might be. Working Memory and Attention are two capacities acknowledged to be fundamental to human thinking (e.g., Berk, 2000; Hetherington & Parke, 1999; Shaffer, 1999).

The great importance attributed to Working Memory and Attention is seen in the numerous models and research hypotheses that consider them. Working Memory, for example, is an essential component in the Neo-Piagetian theories of Pascual-Leone and Case (e.g., 1980, 1992 respectively), and it links the diverse studies that examine memory strategies (e.g., Baker-Ward, Ornstein, & Holden, 1984; Coyle & Bjorklund, 1997; McGilly & Siegler, 1990; Schneider & Pressley, 1997). Attention capacity occupies an important part in the Level-of-Processing model (Baddeley, 1992) and is extensively studied under the topics of Selectivity and Adaptability (including cognitive inhibition and attention strategies) and Planning (e.g., DeMaaraie-Dreblow & Miller, 1988; Dempster, 1993; Ruff & Lawson, 1990; Woody-Ramsey & Miller, 1988).

Particular to Working Memory and Attention capacities is that by definition both involve awareness. Psychological references describe Working Memory (whether or not distinguished from Short-Term Memory) as the “conscious part of our mental system,” while Attention is defined in terms of “the conscious directing to one’s thoughts” (e.g., Berk, 2000; Hetherington & Parke, 1999; Shaffer, 1999). This communality has not been acknowledged in the academic literature. Consciousness is rarely considered by psychologists as a phenomenon to be studied for itself. In Defense of Human Consciousness (Rychlak, 1997) is a mainstream psychologist’s invitation to reconsider this position.

Incorporation of the construct of consciousness or awareness within cognitive studies may allow for qualitative new findings and may provide the ground for unification of the highly diverse Information Processing research results. One way to approach this possibility is to study the impact of techniques for development of awareness on cognitive performance. If mental capacities are fundamental to cognitive accomplishment and if mental capacities are defined in terms of awareness, training that develops awareness should have an impact on both.

A systematic procedure to develop awareness is available in the form of the Transcendental Meditation (TM) technique. This technique is thought- and emotion-independent, and it is intended to directly enhance the growth of consciousness in an accumulative fashion (Maharishi Mahesh Yogi, 1968). The neutral nature of the technique and its inherent purpose make it a particularly suitable tool for an experimental study of awareness. This technique has been the subject of hundreds of scientific studies, a number of which indicate development of cogni-
itive abilities (Chalmers, Clements, Schenkluhn, & Weinless, 1989; Orme-Johnson & Farrow, 1977; Wallace, Orme-Johnson, & Dillbeck, 1990). Children below the age of 10 practice the Word of Wisdom, which is a related technique (see Method section). This is one of the first studies examining practitioners of the Word of Wisdom technique.

This present study examined the two following hypotheses:

H1  Working Memory and Attention capacities play a role in cognitive development. In particular, Working Memory and Attention account for a significant amount of the variance on Piaget’s conservation tasks.

H2  Development of awareness is related to the development of mental capacities and cognitive accomplishment. In particular Working Memory, Attention, and Piaget’s Conservation tasks performance are enhanced in children who practice the Transcendental Meditation or Word of Wisdom technique compared with those who do not. For children who practice one of these techniques, the number of years of practice will be related to their level of Working Memory and Attention and to their performance of Piaget’s Conservation tasks.

METHOD

Participants

Children in group 1 were pupils at Maharishi International University School (MIU, now named Maharishi School of the Age of Enlightenment) in Fairfield, Iowa, n = 60, ages = 5 to 11 years, grades = K to 5, Mean Verbal IQ = 108, Mean performance IQ = 129, SES ranges from level 1 to 6 (Table 1). The participants were about one-third of their grade population; each third name on an alphabetical class list was selected. Three children identified by the school as having learning disabilities were excluded from the study.

The school adopts the Iowa State curriculum and adds to it twice-daily practice of the Transcendental Meditation (TM) technique or Word of Wisdom for younger students. It is open 180 days a year, 5 hours a day, thus providing fewer teaching hours than most North American schools. All teachers and at least one parent of each child practice the TM technique. At the time of the study, most parents were newcomers to the community (5 to 9 years of residency in Fairfield).

The Transcendental Meditation and Word of Wisdom techniques. These techniques are taught in a standardized way worldwide by teachers authorized by Maharishi Mahesh Yogi. The actual meditation proce-
dures and the way they are taught form a holistic unit which is said to be valid only as such. The details of this unit are not disclosed.

The Transcendental Meditation technique is practiced twice daily, sitting with eyes closed. It is taught to individuals age 10 or older. The quintessence of the Transcendental Meditation technique is the directing of the conscious mind to attend to deeper levels of consciousness (Maharishi Mahesh Yogi, 1968). The only substance involved is a “mantra” which is a sound without meaning. In other words, this is a practice where awareness is being directed towards itself, and it involves no cognitive content.

The Word of Wisdom technique is taught prior to age 10. It is practiced for about 5 minutes twice daily while engaging in light informal activity, such as walking. The Word of Wisdom technique, like the Transcendental Meditation technique, is described as promoting a settled, more expanded state of awareness and more balance in mind and body (Dixon, 1990).

Children in group 2 were pupils attending three Alternative Toronto schools, n = 75, ages 5 to 11 grades = K to 5, Mean Verbal IQ = 114, Mean Performance IQ = 124, SES ranges from level 1 to 6 (Table 1).

The alternative schools are generally regarded as having higher achievement standards. Forty-six (61%) of the children came from a single school (T1), and they formed almost the entire school population from kindergarten to grade 5. Twelve (16%) children came from a school that shared the same building and principal as the first school (T2). The main difference between these two schools is that the former allows greater parental involvement. The children in the second school were selected by the teachers according to availability. Seventeen (23%) of the children came from a third unrelated school (T3). The children in this school were selected at random from the alphabetic class list. None of the children had an identified learning disability.

These schools were presumed to match the MIU School in the aspect of catering to parents who have an interest in providing their children with non-mainstream education. None of the parents or children in the Toronto schools practiced a meditation or relaxation technique regularly.

A pretest statistical comparison of the groups revealed that they did not differ on Verbal IQ: T(130) = -1.67, p = .10, on Performance IQ: T(132) = 1.44, p = .15, or on age levels: T(133) = -.32, p = .75.

Measures

Conservation Tasks. These tasks measure the conservation attributes of number, substance, weight, and volume displacement. They were designed to follow a highly standardized routine and to closely resemble
Piaget’s procedures (Inhelder, 1968). The tasks were presented in decreasing order of difficulty to avoid a learning effect.

**Mental Capacity 1: Working Memory.** This capacity delineates the ability to consciously attend to internal mental information. Two tasks were used to measure Working Memory: (a) Figure Intersection Test (FIT) by Pascual-Leone (1965, 1967) and (b) Backward Digit Span (BDS) from the Wechsler Intelligence Scale for Children—Revised (1974). The combined scores of FIT and BDS were used to reflect Working Memory.

For FIT, both reliability (across and within age groups) and validity (in terms of correlations with criterion variables) are reported to be in the .70s (Johnson, 1982). For BDS, the stability coefficient is reported to be .81, and the validity is reflected in terms of developmental increase of score with age (Wechsler, 1974).

**Mental Capacity 2: Attention.** This capacity delineates the ability to consciously sustain attention on externally presented information. In this study, attention was measured with Karp’s Cancellation Test (1962).
This test appears to be the only standardized measurement that is suitable for young children and that allows for a simple group setting procedure. Because it uses letters of the alphabet, it is considered to be too difficult for grades K and 1, so it was not given to them.

Karp’s Cancellation Test is found to be valid in terms of correlations with teachers’ ratings of Sustained Attention ability (r = .42, Parkinson, 1975). In the present study, Karp’s test significantly correlated with Toronto school teachers’ ratings of the child’s ability to sustain attention (r = .27, p < .05). (No ratings were obtained from MIU School teachers because testing in this school took place at the beginning of the year and teachers were not expected to be sufficiently familiar with their students to rate them.) The reliability of Karp’s Cancellation test is unknown.

Mental Capacity 3: Reflectivity. This capacity delineates the ability not to act impulsively. It was measured by the mean reaction time taken to complete the FIT items. This measure has not been studied previously. Validity for it is suggested by the present finding of significant correlations between slower reaction time and higher achievement on the FIT (r = .63, p < .0001). Inter-correlation of the reaction times with the FIT items is alpha = .78. This capacity has also not been studied previously. The use of FIT afforded easy calculation of this capacity, and so it was included here for exploratory purposes.

Mental Capacity 4: Flexibility. This capacity delineates mental flexibility. It was measured by the variance reaction time to the FIT items. This measure has also not been used previously. Validity for it is suggested by the present finding of significant correlations between reaction time and item difficulty (r = .32, p < .0001). This indicates that participants varied their reaction times to suit each item’s level of difficulty. The use of FIT afforded easy calculation of this capacity, and so it was included here for exploratory purposes.

There were no significant correlations between Flexibility and Reflectivity scores, indicating that they represent two independent capacities (r = .04, p = .34).

Verbal Intelligence. This was measured by the Vocabulary sub-test of the Wechsler Intelligence Scales (WPPSI for 5- and 6-year olds, WISC-R for 7- to 10-year olds). Reliability over time for these is reported to be in the .70s. Validity, in terms of correlating with Verbal Intelligence, ranges from .64 to .94 (Wechsler, 1974, 1976). This scale was scored by two independent raters “blind” to group condition. Their initial agreement was 94%; they resolved the conflicting ratings through a discussion.

Performance Intelligence. This was measured by Cattell Culture Fair test (Scale A for 5 to 7 year olds, and Scale B for 9 to 10 year olds).
Reliability in terms of inner item consistency is reported to range from .80 to .91. Validity is confirmed in terms of factor-analysis that matches the structure of the sub-scales (Cattell, 1967, 1973).

*Home Background Measure.* A questionnaire devised by the researcher was used to assess home background information. It solicited SES information and parents’ demographics. For Toronto participants, it also solicited information about the practice of any meditation or relaxation technique by the children or parents. For MIU School participants, it solicited information about the number of years of practice of the TM or Word of Wisdom technique by the child and his or her parents, and other parental involvement with the TM program, such as teaching it.

Socioeconomic status (SES) was measured according to Blishen and McRoberts (1976) for Canadian participants and according to Powers and Holmberg (1982) for MIU School participants. Both are 6-point scales, they employ the same occupational categories, and they correlate at .80 level (B.R. Blishen, personal communication, 1984). When comparing participants across countries, it is deemed to be more accurate to compare them according to the SES level that they actually occupy in their own environment, hence the use of different scales.

**Procedure**

MIU School data was collected during the first month of the academic year of 1985, and Toronto data was collected approximately 4 months later.

Testing took place in three sessions. Tests were conducted by the researcher, with one exception, see section (3) below. Individual testing was conducted before group testing.

1. An individual child was tested on Conservation. Then the vocabulary test and Backward Digit Span were administered in a counterbalanced order. The order of testing was varied at random by age. It was achieved by casting a die and then modifying the order to accommodate the schools’ needs.

2. Group test for about five children of the same grade with the Figure Intersection Test (FIT).

3. Group test for Cattell’s Culture-Fair IQ and Karp’s Cancellation Test. The tests were administered in a random order, usually not on the same day, according to the teacher’s convenience.

For five- and six-year-olds, the group session consisted of about five children chosen by the teacher. For children seven years and older, the group consisted of the entire class. This was the only time when testing was conducted by the teacher.
RESULTS

Demographic Variables and Performance Scores

SES did not correlate with any of the performance scores. Age correlated with all performance scores with the exception of the “Flexibility” score ($r = .33$ to $.75$, $p < .0001$). Parental characteristics yielded two significant correlations out of 35 possible correlations: Backward Digit Span with mother’s age, $r = .17$, $p < .01$, and Conservation with mother’s educational level, $r = .21$, $p < .05$.

Mental Capacities and Conservation Performance

Four regression models indicate that mental capacities and demographics explain significant amounts of the variance of conservation performance. Most of the variance was accounted for by Working Memory ($r = .28$ to .31) and Attention ($r = -.21$ to -.24) capacities.

Model 1: All eight variables were used, including Working Memory and Attention. The population was grades 2 to 5 (grades K and 1 were not tested on Attention), $n = 75$, $R = .60$, $R^2 = .36$, $F = 4.46$, $p = .002$.

Model 2: Seven variables were used, including Working Memory and omitting Attention. The population was grades K to 5, $n = 111$, $R = .55$, $R^2 = .30$, $F = 3.83$, $p < .0001$.

Regression Models 3 and 4 examined Working Memory when measured by either FIT or BDS alone. The results were comparable with Model 1. For Model 3, all eight variables were used; Working Memory was measured by FIT score alone. The population was grades 2 to 5, $n = 75$, $R = .60$, $R^2 = .36$, $F = 4.80$, $p < .0001$. For Model 4, all eight variables were used; Working Memory was measured by BDS score alone. The population was grades 2 to 5, $n = 75$, $R = .55$, $R^2 = .31$, $F = 3.64$, $p < .0014$.

Training of Awareness and Cognitive Variables

Multivariate analyses indicate that the MIU School group performed at a higher level than the Toronto group when all cognitive variables are taken together and age, Verbal IQ, and Performance IQ are partialed out.

Multivariate analysis (1): Cognitive variables were Working Memory, Attention, Reflectivity, Flexibility, and Conservation; grades were 2 to 5; $n = 81$; for all tests (Pillais, Hotellings, Wilks, Roys) Approximate $F = 11.57$, Hypothetical $F = 5.00$, $p < .0001$. Multivariate analysis (2): Cognitive variables were Working Memory, Reflectivity, Flexibility, and Conservation; grades were K to 5, $N = 126$; for all tests (Pillais, Hotellings, Wilks, Roys) Approximate $F = 11.72$, Hypothetical $F = 4.00$, $p < .0001$. 
Mean scores of cognitive variables indicate superiority of the MIU School group. Univariate tests revealed that this difference is significant for most variables. Exceptions are Conservation when grades K and 1 are excluded; Flexibility is on the borderline \(p = .06\) (Table 3).

For MIU School children, there was a significant relationship between the number of months of practice of the Transcendental Meditation or Word of Wisdom technique and their achievement on 4 out of 7 cognitive variables \((p < .05\) to \(p < .0001\), Table 4). The length of time they had attended the MIU School related significantly to only 1 out of the 7 variables \((p < .05\), Table 6). Parents’ association with the

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>Simultaneous Regression Analysis for Variables Predicting Conservation Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>(\beta)</td>
</tr>
<tr>
<td><strong>Model 1</strong></td>
<td></td>
</tr>
<tr>
<td>Working Memory</td>
<td>1.34</td>
</tr>
<tr>
<td>Attention</td>
<td>-.07</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>-.04</td>
</tr>
<tr>
<td>Flexibility</td>
<td>.00</td>
</tr>
<tr>
<td>Age</td>
<td>.03</td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>.09</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>.01</td>
</tr>
<tr>
<td>SES</td>
<td>.12</td>
</tr>
<tr>
<td>Constant</td>
<td>.40</td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
<td></td>
</tr>
<tr>
<td>Working Memory</td>
<td>1.20</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>.02</td>
</tr>
<tr>
<td>Flexibility</td>
<td>.00</td>
</tr>
<tr>
<td>Age</td>
<td>.00</td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>.07</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>-.512</td>
</tr>
<tr>
<td>SES</td>
<td>.13</td>
</tr>
<tr>
<td>Constant</td>
<td>.61</td>
</tr>
</tbody>
</table>

*p = .02; **p = .002; ***p = .0009.

Note: \(P.r\) is the correlation when all other variables are partialled out.

Population = grades 2 to 5

Regression Term:
- **Model 1**: \((8\ df); SS = 226.42, MS = 28.30\)
- **Model 2**: \((7\ df); SS = 284.74, MS = 40.68\)

Residual Term:
- **Model 1**: \((66\ df); SS = 402.62, MS = 6.10\)
- **Model 2**: \((103\ df); SS = 650.32, MS = 6.31\)
### TABLE 3
Univariate Analysis, Mean Scores and F Values: Cognitive Variables by Group Condition

<table>
<thead>
<tr>
<th>School</th>
<th>MIU School</th>
<th>Toronto Schools</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grades 2–5 (n = 81)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working Memory</td>
<td>4.26</td>
<td>3.85</td>
<td>9.40***</td>
</tr>
<tr>
<td>Attention</td>
<td>36.56</td>
<td>38.88</td>
<td>.75</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>47.80</td>
<td>36.10</td>
<td>45.75****</td>
</tr>
<tr>
<td>Flexibility</td>
<td>449.98</td>
<td>195.99</td>
<td>35.01****</td>
</tr>
<tr>
<td>Conservation</td>
<td>7.67</td>
<td>7.01</td>
<td>1.75</td>
</tr>
<tr>
<td><strong>Grades K–5 (n = 126)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working Memory</td>
<td>3.64</td>
<td>3.31</td>
<td>6.75**</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>40.92</td>
<td>29.60</td>
<td>41.67****</td>
</tr>
<tr>
<td>Flexibility</td>
<td>676.82</td>
<td>258.76</td>
<td>3.76*</td>
</tr>
<tr>
<td>Conservation</td>
<td>7.15</td>
<td>6.12</td>
<td>5.03</td>
</tr>
</tbody>
</table>

****p < .0001; ***p = .003; **p = .011; *p = .055.

*Note: Age, Verbal IQ, and Performance IQ are partialed out.*

### TABLE 4
Correlations between Cognitive Variables and the Child’s Years of Practicing TM and/or Word of Wisdom and Years of Attendance at MIU School

<table>
<thead>
<tr>
<th></th>
<th>Yrs practicing TM or Word of Wisdom</th>
<th>Years attending MIU School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working memory</td>
<td>.61**</td>
<td>.16</td>
</tr>
<tr>
<td>Attention</td>
<td>.04</td>
<td>-.18</td>
</tr>
<tr>
<td>Reflectivity</td>
<td>.32*</td>
<td>.27*</td>
</tr>
<tr>
<td>Flexibility</td>
<td>-.12</td>
<td>-.05</td>
</tr>
<tr>
<td>Conservation</td>
<td>.30*</td>
<td>.05</td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>.53**</td>
<td>.02</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>-.11</td>
<td>-.21</td>
</tr>
</tbody>
</table>

*p < .05; **p < .0001.

*Note: n = 52. Correlations of Verbal IQ and Performance IQ are partialed out for age. For distractibility n = 32 (grades 2 to 5). Working memory is partialed out.*
Transcendental Meditation program, in terms of length of practice of the TM technique, practice of the advanced TM-Sidhi program, and their possible experience teaching the TM program, resulted in 8 out of 42 possible correlations (p < .05, Table 5).

**DISCUSSION**

**Mental Capacities and Conservation Performance**

The prediction that Working Memory and Attention capacities account for a significant amount of the variance of Piaget’s conservation tasks is largely confirmed. The regression models which included Working Memory, three measures of attention and demographic variables explain 36% (p = .0002) and 30% (p = .00001) of the variance. Working Memory significantly correlated with conservation performance (r = .53, p = .002).

The finding concurs with the basic claim of the Information Processing approach that mental capacities are at the basis of cognitive accomplishment. The finding specifically supports Pascual-Leone’s theory (and Case’s version of it) which predicts a particular relationship between Working Memory, or M-power units, and conservation tasks performance.

An interesting additional finding is that the Working Memory score explains a larger amount of the variance than either one of the two
measures that make it up; i.e., Working Memory: 10% compared with Backward Digit Span (BDS): 4% and Figure Intersection Test (FIT): 7%. This suggests that Working Memory, as defined here, is a capacity that operates independently of the visual (FIT) and auditory (BDS) sensory modalities. Working Memory seems to be a central amodal capacity.

Attention was not found to correlate with conservation performance \( (r = -.02) \). The apparent negative correlation between the partialed-out attention score and conservation \( (r = -.24) \) is a statistical artifact. The partialed-out attention score is a residual score after the parts of it that overlap with the other measures are removed. It is not possible to conceptualize what the partialed-out attention score represents.

Conservation performance experiments carried out mostly in the 1970s did not measure attentional capacity directly, but they did find that attention training improves performance (e.g., Gelman, 1982; Hamilton, 1973; Hurley 1982; Kaplan, 1981; Martinko & Clifford, 1978). Possibly, the present measure of attention does not represent the capacity that was manipulated in these experiments. The present measure may also not represent the attention capacity that is measured in recent information processing studies (e.g., Bjorklund & Harnishfeger, 1990, 1995; Dempster, 1993, 1995; Friedman & Scholnick, 1997; Scholnick, 1995). In these studies, attention is usually measured in elaborate experimental settings where auditory background constitutes the distracting stimulus. Here attention was measured by a short paper and pencil visual test. Attention is a paramount construct in cognition. It is important that future studies compare the different measurements and agree upon an empirical definition of attention.

A subsequent step in confirming the Information Processing perspective on development would be to use a longitudinal design. Finding that growth of mental capacities precedes cognitive advancement will confirm the capacities’ primary role in development.

**Transcendental Meditation Practice and Cognitive Performance**

*Between Groups Comparison.* The second prediction that training in awareness contributes to the development of mental capacities and cognitive performance was supported. Multivariate analyses of the various cognitive measures used in this study reveal that children who experience training of awareness in the form of the Transcendental Meditation technique or the Word of Wisdom technique perform at a more advanced level than those who do not \( (p < .0001) \). Univariate analysis of each of the measures reveal that this observed difference holds for the majority of cognitive variables (Table 3).
It is noted that the compared groups maintain this difference even though they do not differ on SES, and Age and IQ scores are held constant. These demographic variables cannot be taken to explain the observed difference in performance.

Within Group Examination. The number of months of practice of the Transcendental Meditation or the Word of Wisdom technique by a child correlated with 4 out of the 7 cognitive variables measured (r ranging from .30 to .61, Table 4). These four correlations are concerned with the direct effect of these practices on the child’s cognitive development. However, age was not partialed out for 4 of these variables to avoid the removal of true variance. Thus, only in the case of Verbal IQ, where age was partialed out, is it empirically clear that training of awareness influences cognitive development.

Future research may confirm that practice of the Transcendental Meditation or the Word of Wisdom technique correlates only with some cognitive variables and that the degree of these correlations varies. Such findings could provide support to the conceptualization of the mind in terms of levels-of-processing (Craik & Lockhart, 1972), as opposed to the store model (Atkinson & Shiffrin, 1968), and would also fit within Alexander et al.’s (1990) view of the mind. The variables that are found to correlate with practice of the Transcendental Meditation and Word of Wisdom technique may present capacities and processes that exist at levels of the mind which are closer to conscious awareness. Closeness to conscious awareness would make these capacities and processes more readily influenced by an awareness practice. If this speculation is correct, a developmental trend would be found where, for children of the same age, a greater number of years of practice would be correlated with performance on a broader range of cognitive variables.

Another future research study could plot the developmental curves of cognitive variables. This could be the beginning of a sketch of faculties of the mind and their growth. It would also be of interest to see if training in awareness facilitates the development of mental capacities and processes beyond the years of early adulthood, and if so, what form it takes at that time.

The number of years of parental involvement with the Transcendental Meditation program, as defined by six indices, reveal five significant correlations out of 42 possible ones (r ranging from .34 to .24, Table 5). These correlations are concerned with the indirect effect of the Transcendental Meditation practice, through modification of the home environment. The number of years in the MIU School correlates with 1 out of 7 cognitive variables (r = .27, Table 4). This correlation is also concerned with the indirect effect of the Transcendental Meditation practice through
modification of the school environment. However, 4 out of 5 correlations for parental involvement and 1 correlation for number of years in MIU School are speculative since age was not partialed out. If these correlations are due to age, then parental and school environment would have even less influence on cognitive achievement than suggested here.

Despite the speculative nature of all the correlations, except for IQ scores, training of awareness appears to have a broader (more variables) and greater (higher correlations) impact on cognition than the environmental variables associated with this training.

Future Design Considerations. A larger number of participants would have allowed for a regression analysis. Such an analysis can estimate the relative impact of all the different variables studied. The simultaneous contribution of demographic variables and Transcendental Meditation or Word of Wisdom practice to cognitive performance would be described more precisely.

An additional improvement would be to use measures that are standardized for age. Currently, no cognitive measures independent of age are available. An exception are the IQ measures. In the case of Verbal IQ, length of practice of the TM or Word of Wisdom technique significantly correlates with performance after partialing out age (r = .53, p < .0001). This finding indicates that training of awareness may enhance the normal maturation that is responsible for progress in cognitive accomplishment.

Future studies would benefit from random assignment of participants into groups. This may be more feasible in the future when meditation becomes recognized as a neutral tool for the development of awareness.

Implications of the Findings

The Transcendental Meditation and Word of Wisdom Techniques. The importance of the present findings cannot be overstated when we examine them in the light of two developmental phenomena. One, development between the ages of 5 and 10 is normally very rapid, as seen, for example, in conservation performance. Two, all attempts to facilitate cognitive growth consist of lengthy and elaborate intervention procedures, such as conservation training and educational enrichment programs. The present study indicates that this already rapid cognitive development can be further enhanced through simple procedures that take only a few minutes twice a day.

This is an astounding finding, even if we consider only the most researched variable, the verbal IQ where age was partialed out (r = .53, p < .0001). This result calls for a close study of the Transcendental
Meditation and Word of Wisdom techniques. There are over 600 research studies on the Transcendental Meditation technique; relatively few of them are in the area of cognition and even fewer were conducted with children (Chalmers et al., 1989; Orme-Johnson & Farrow, 1977; Wallace et al., 1990). In all these cases, the Transcendental Meditation technique is regarded as a tool and is not studied as a theoretical construct. Still, the essence of the Transcendental Meditation technique is that it addresses awareness. If awareness is indeed the phenomenon that is responsible for the impact of the Transcendental Meditation technique, the serious study of awareness needs to be considered.

**Awareness.** As noted in the Introduction, awareness in cognitive studies is primarily used to define mental capacities rather than being studied as a phenomenon on its own. Awareness is primarily considered within clinical psychology, mostly within Freud’s and Jung’s theories; empirical attempts to study it are minimal (Rychlak, 1997). An important contribution of the present study is to demonstrate that awareness can be studied within the current research paradigm. Mental capacities that are described in terms of awareness are found to be related to cognitive performance, and training of awareness is found to be related to cognitive advancement.

The study of awareness as its own phenomenon offers psychologists a qualitative new vista. One indication for the theoretical potential of awareness as a concept is that it is not described in biological terms, nor is it defined as an aspect of the environment. It is placed beyond the nature–nurture dichotomy that makes up our current academic framework. Another indication is that Eastern schools of thought present awareness as a holistic primary level of reality (e.g., Maharishi Mahesh Yogi, 1997). Such a presentation suggests that awareness may be the psychological equivalent to the field of quantum reality in physics. Researching the construct of awareness as a field in its own right may offer new possibilities for understanding human development.
REFERENCES


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