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## **The Dennisons Respond to Questions Regarding *Brain Gym*<sup>®</sup>: *Teacher's Edition***

In updating *Brain Gym*<sup>®</sup>: *Teacher's Edition*, Paul and Gail Dennison are continuing to review the best scientific research. Meanwhile, working in conjunction with Brain Gym<sup>®</sup> International, the Dennisons have offered the following responses to questions recently raised about the book by a U.K. group called Sense About Science.

"In our books," the Dennisons begin, "we talk about the brain from the perspective of educators who often see movement bring about an immediate change in behavior. We also speak from our understanding of the most recent scientific research, which reveals that the brain is dynamic in function and constantly reorganizing itself.

"*Brain Gym*<sup>®</sup>: *Teacher's Edition* is not, as Sense About Science suggests, intended for student use. It is the companion guide and teaching aid for *Brain Gym*<sup>®</sup>: *Simple Activities for Whole-Brain Learning*, which is the book intended for students."

### BRAIN GYM ACTIVITIES

**BGTE:** "Brain Gym activities . . . enable students to access those parts of the brain previously inaccessible to them."

**Dr. Beth Losiewicz**, cognitive scientist: "There is no evidence whatsoever that any part of the brain goes 'unused.'"

**The Dennisons:** Our clinical research shows that the whole-brain performance of students with learning challenges is inhibited. We usually understand this as their inability to process at the lateral midline or to express what they know. The Brain Gym activities are intended to help such students process comfortably at the midline, and that is indeed what the movements appear to do. We see our students as normal individuals with learned, ineffective movement patterns, known as specific language disabilities. We do not claim to change their brains, only to help them learn new movement patterns that will more successfully access corresponding skills and functions.

## THE POSITIVE POINTS

**BGTE:** “. . . the student touches above each eye with the fingertips of each hand . . . halfway between the hairline and the eyebrows. The Positive Points bring blood flow from the hypothalamus to the frontal lobes, where rational thought occurs.”

**Professor David Attwell**, neuroscientist: “Rational thought does not occur in the frontal lobes, and there is no evidence that touching these points can alter blood flow within the brain.”

**The Dennisons:** Recent opinion (such as the work of neuroscientist Dr. Elkonen Goldberg, author of *The Executive Brain*) asserts that the frontal lobes are involved in reasoning, high-order functioning, judgment, and rational behavior. And most physiology books support the premise that touch stimulates circulation to the area of the body touched—a principle used in such modalities as acupressure and massage. Hence we theorize that holding the Positive Points improves circulation to the frontal area of the brain. Our students report that, after holding the Positive Points, they are better able to think clearly, make choices, consider consequences, and let go of emotional overlay from past experiences.

## THE LENGTHENING ACTIVITIES

**BGTE:** “. . . help students to develop and reinforce those neural pathways that enable them to make connections between what they already know in the back of the brain and the ability to express and process that information in the front of the brain.”

**Dr. Stan Lazic**, neurobiologist: “This statement implies that knowledge is stored in the back of the brain and that information processing occurs in the front. This is not how the brain works; information is processed throughout the whole brain, and knowledge is distributed as well.”

**The Dennisons:** We agree with Dr. Lazic’s statement. Yet we find that many students with learning challenges are unable to stand with relaxed knees, sacrum, and/or occiput; this reflexive posture correlates with their inability to express themselves. In Edu-K, we don’t claim to change the brain, only to help students participate more successfully. When students do the recommended activities, their knees, sacrum, and occipital area can relax, and they begin to exhibit greater ability to self-calm and make conscious choices.

## THE ELEPHANT

**BGTE:** The Elephant movement “. . . activates the inner ear for improved balance and equilibrium and also integrates the brain for listening with both ears . . .”

**Dr. Beth Losiewicz,** cognitive scientist: “This movement could help children with specific balance and equilibrium problems. However, the mechanisms of binaural hearing are completely unrelated to those of balance and equilibrium.”

**The Dennisons:** The activity known as the Elephant seems to improve both balance and listening ability. We have not said that there is a relationship between mechanisms of binaural hearing and those of balance and equilibrium. Improved vestibular balance can be a key to improved learning ability and performance. We make no medical claims about improved binaural hearing; however, our observations have shown that improvements in head-turning ability correlate with perceived improvements in listening and sometimes even hearing. In one research study, students had improved test results on an audiometer after ten minutes of doing the Elephant and other Brain Gym activities (Khalsa, 1990).

## BRAIN BUTTONS

**BGTE:** “The Brain Buttons . . . are massaged deeply with one hand while holding the navel with the other hand. . . .” They activate the brain for “sending messages from the right brain hemisphere to the left side of the body, and vice versa; receiving increased oxygen; stimulation of the carotid artery for increased blood supply to the brain; an increased flow of electromagnetic energy.”

**Professor David Atwell,** neuroscientist: “There is no evidence that rubbing these areas promotes signaling from the right brain to the left side of the body. The brain would only receive increased oxygen if its blood flow increased, but stimulating receptors in the carotid sinus leads to a fall of cardiac output and potentially a decreased oxygen flow to the brain. Massage of these points does not generate electromagnetic energy in the form of radiated light, heat or radio waves.”

**The Dennisons:** Students frequently report that, when they stimulate these points, they experience immediate improvement in left-right/ right-left coordination of the eyes and whole body, for clarity of vision and improved reading and contralateral movement. We hypothesize that these points are electrical reflex points, and that

through their stimulation oxygen becomes more available. By “electromagnetic energy,” we mean that subtle form of energy attested to by thousands of years of acupuncture and traditional healing as well as a growing body of biomedical research.

## THE CENTERING DIMENSION

**BGTE:** “Centering is the ability to cross the midline between the upper and lower body and the corresponding upper and lower brain functions: the midbrain (emotional content) and cerebrum (abstract thought). Nothing can be truly learned without feeling and a sense of meaningfulness.”

**Dr. Spencer LaVere Smith**, neuroscientist: “The idea of symmetry between brain and body does not hold true. The top of the body doesn’t match with the top of the brain, and so on. Also, the midbrain isn’t the seat of emotional content. Emotional content is processed all over the brain, including the cerebrum and the amygdala.”

**The Dennisons:** When we refer to physical correspondence, we do not mean symmetry. Further, as movement educators we refer to a model known as the “triune brain,” posited by the late neuroscientist and psychiatrist Paul D. MacLean (who distinguished himself at Yale Medical School and the National Institute of Mental Health) to make a distinction between mental and emotional activity and point out the importance of access to both modalities through movement. Our students learn to notice when they are being overly analytical or experiencing a fight-or-flight response. When not under stress, they can indeed process emotional content all over the brain, including the cerebrum and the amygdala, just as Dr. Smith describes.

## HOOK-UPS

**BGTE:** “In the same way that electrical circuits in a house can become overloaded, neurological and physiological signals can become jammed and switch off, blocking the normal flow of brain-body communication . . . Hook-ups connect the electrical circuits in the body . . . ”

**Dr. Stan Lazic**, neurobiologist: “This sounds plausible, but in reality the only time a neurological signal would become “jammed”, “blocked”, or “switched off” is during a pathological event such as a seizure, stroke, head trauma, or perhaps due to a neurodegenerative disorder.”

**The Dennisons:** We used the metaphor of the house circuitry to explain the stress response. When students recognize that they cannot think clearly, remember, or make choices, they associate this with the concept of being “on overload.” They can then take a break with Hook-ups or some other Brain Gym activity. This is a stress-management tool, not a medical-model response to a pathological event.

## NECK ROLLS

**BGTE:** “When the neck muscles are strong and there is fully developed head and body differentiation, the neurological circuitry between brain and body is available for optimal performance and achievement.”

**Dr. Alana Watt,** neuroscientist: “The neural circuitry that connects the brain and the body is the spinal cord, which is located in and protected by the spinal column. While the brain communicates with all the muscles of the body including the neck muscles, the strength of these muscles does not affect the performance of the spinal cord.”

**The Dennisons:** As movement educators, we observe the relationship of body posture to function and a lack of postural integrity to dysfunction. While we agree with Dr. Watt, it is also true that the spinal column passes through the neck. Observation shows that weakness of the neck muscles, especially a one-sided weakness, affects head-holding ability and centralized focus in the midfield, as well as differentiation of head movement. It seems to follow, then, that healthy, strong, and flexible neck muscles contribute to optimal learning.

## RANGE OF MOTION

**BGTE:** “. . . increasing the spinal column’s range of motion improves lines of communication between the central nervous system and the brain.”

**Dr. Beth Losiewicz,** cognitive scientist: “If the nerves in the spinal column are completely blocked, there will be no communication between the affected parts of the body and the brain; it is called paralysis. There is no reason to believe you can specifically enhance those brain/body messages with exercises that increase the range of motion of the spinal cord.”

**The Dennisons:** Our text was not describing a medical problem in the spinal column; increased range of motion can be slight, on a continuum. Many students notice that their abilities to comprehend and think independently have improved upon increased spinal flexibility.

## SIPPING WATER

**BGTE:** “All liquids [other than water] are processed in the body as food, and do not serve the body’s water needs . . . Processed foods do not contain water . . .”

**Ian Robinson**, neuroscientist: “Cola, coffee and beer are not treated like food at all; they are absorbed through the stomach and intestines by exactly the same mechanism as a glass of water. Processed foods usually contain a large amount of water, just read the back of a packet of processed ham.”

**The Dennisons:** Much has been written on the human need for fresh drinking water. Our statement that processed foods don’t contain water was edited for brevity, and should have said that such foods don’t contain *readily available* water. The next edition will be amended to reflect the fact that processed foods contain varying amounts of what food scientists call “active water.” While these scientists recognize that the stability of processed foods depends in large part on the level of active water, little research has been done on the effects of pure water vs. active water in the body. We observe that students improve their ability to learn, think, and remember when allowed to sip water in class. We don’t see this result when students are relying only on water from processed foods.

## WATER AS AN ELECTRICAL CONDUCTOR

**BGTE:** “Water is an excellent conductor of electrical energy . . . [drinking water] activates the brain for efficient storage and retrieval of information.”

**Dr. Phillip Coan**, physiologist: “Water is a poor conductor and only by containing dissolved metallic solids such as salt is water able to conduct.”

**The Dennisons:** Yes, it is the electrolytes in water that conduct electricity within the body. This is why, for our Sipping Water activity, we favor the drinking of spring water that provides electrolytes.

## ELECTRONIC EQUIPMENT AND DEHYDRATION

**BGTE:** “Working with electronic equipment (e.g., televisions and computer terminals) is dehydrating to the body.”

**Dr. Spencer LaVere Smith**, neuroscientist: “Electronic equipment has no special ability to dehydrate people. Working with electronics is as dehydrating as reading a book, which is to say, not very dehydrating.”

**The Dennisons:** Dehydration is commonly listed among the symptoms of excessive exposure to electromagnetic frequencies. We speak from experience when we say that the physical stress of sitting and gazing at a TV screen or computer monitor appear to call for the user to drink ample water for optimal functioning.

## THE BRAIN GYM MOVEMENTS

**BGTE:** “Brain Gym is a series of simple and enjoyable movements that we use with our students in Educational Kinesiology (Edu-K) to enhance their experience of whole-brain learning. These activities make all types of learning easier, and are especially effective with academic skills.”

**Colin Blakemore**, neuroscientist: “I know of no evidence to support the claim that, by doing a particular repetitive activity, children will gain general benefits in learning. There have been a few peer reviewed scientific studies into the methods of Brain Gym, but none of them found a significant improvement in general academic skills.”

**The Dennisons:** Through the last twenty years, Brain Gym® International has made available to the public more than a hundred anecdotal, qualitative, and quantitative studies and reports, conducted by various individuals with diverse populations around the world. These studies, available in the Research Chronology and published in *Brain Gym® Journal*, do demonstrate significant improvements while providing data and trends for more in-depth peer-reviewed research in the future. The growing body of literature in the field of neural plasticity is verifying that movement grows the brain throughout the human lifetime. The movements that grow new neural pathways are not repetitive ones but specific and deliberate developmental movements or interventions, as in the Brain Gym program.

## CLOSING THOUGHTS

The Dennisons and Brain Gym® International are asking instructors to resist the temptation to explain in scientific terms how the Brain Gym movements activate the brain.

- Does the program work? Yes.
- Does it support educators in the classroom? Yes.
- Do we yet know for certain why? No.

As educators, we have no mandate to explain the scientific basis of our work, and until there is a greater body of research to cite we can give only limited explanations. Therefore, unless we can refer to specific research, we'll state our ideas on how Brain Gym works as theoretical only, or as research hypotheses awaiting scientific verification. In such cases we will say, "It *seems* that this is happening," not, "This is what *is* happening."

We extend an open invitation to all researchers to explain through further studies how and why the Brain Gym program obtains such consistent, positive results. Pending such additional research, please refer those who want to know why they should do a specific movement to the writings of brain scientists and neurobiologists.