Examining the Body-Based Components of the Head-to-Toe Method of Associations for Vocabulary Acquisition

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I. Introduction

"Breathe Life into a Stone."

—All's Well That Ends Well (Act 2, Scene 1)

Ponder, for just a moment, the phenomenal universe that exists inside the cranium. This wonderful entity is a mere three-pound organ; it is only two percent of our body weight, but it consumes about 20 percent of our body's energy; and, it possesses anywhere from 86 to 100 billion neurons with the average neuron having up to 10 thousand synaptic connections. If we do the math, that means the brain can create up to 100 trillion synapses—the network of connections is truly astounding! In fact, "this means there are as many connections in a single cubic centimeter of brain tissue as there are stars in the Milky Way galaxy" (Eagleman, 2011, p. 2). These intricate connections store massive amounts of information and memories and would put any computer's memory capacity to shame.

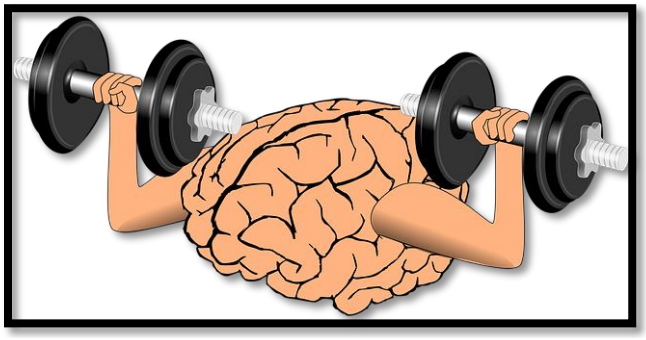
One cannot deny that the brain—with all its dynamic connections—is absolutely amazing. So, why not take advantage of it by being more aware of its capabilities and tapping into its powers while teaching vocabulary? In doing so, we can help our English language learners (ELLs) create an impressive lexicon while simultaneously deepening their understanding of the English language.

As we might recall from the first article in this series, the *Head-to-Toe Method* is all about motivating students to learn vocabulary by personalizing it and creating a great neural web of associations and connections (Randolph, 2015). And, according to John Medina (2009) and others (Eagleman, 2015; Jensen, 2008; Sousa, 2011; Willis, 2006), the more connections that can be made during the all-important encoding process, the better the chance new material has of making its way into the brain's networks of long-term memory. Moreover, the more connections a student has will also help in breaking the dreaded Ebbinghaus curse.

In order, however, for the whole Head-to-Toe Method to work and reach the height of its effectiveness, students must be attentive and prepared to take in the new vocabulary terms and create the needed connections to retain the terms. To allow this to happen, our students must be actively involved in physical exercise, which, in turn, will elicit the necessary neurotransmitters to help them learn and recall the vocabulary. Physical exercise really is the *magical medicine* that can "breathe life into a stone."

My Head-to-Toe Method is composed of four major categories that I have developed: (1) the body-based components; (2) the language-based components; (3) the personal associations-based components; and (4) the repetition and recycling-based components. In this article, I will focus on the first category—body-based components, which, like the other three categories, includes seven parts or "tools" as I prefer to call them. As we survey each one, I will discuss their neuroscience underpinnings and why they are important for the learning process.

II. The Body-Based Components



The body-based components are critically important parts of the Head-to-Toe Method, because four of the tools actually prepare the brain to function and take in new information at an optimal level and maintain that level during class. In John J. Ratey's (2010) book, *Spark! How exercise will improve the performance of your brain,* he discusses the Naperville Project, which features the "Zero Hour PE" class. This particular class was designed to get the brains of the participating students prepared to learn via a morning exercise routine. The students who participated in this program improved their academic skills at impressive rates; their brains were more enhanced and receptive to learning more than their non-participating counterparts.

The first four tools of my body-based components, then, do essentially what the Naperville Project did for its students—they engage the body in physical exercises to prepare a healthy *neuro-environment* for learning. It should be noted that the first four tools of the body-based components are actual physical activities, and the last three tools are body-based but strictly cognitive in nature. Let us now take a look at each tool that I use before and during class.

1. *Pre-Class Exercises*

Drawing from Gretchen Reynolds's claim that "[e]xercise, the latest neuroscience suggests, does more to bolster thinking than thinking does" (2012, para. 1), I start each class with physical exercises. These exercises are done directly before we study vocabulary, so my students' minds are alert, focused, and ready to retain the new lexical items of the day. (Note: I usually teach three lexical terms at the beginning of each lesson.) The purpose of these pre-class exercises is to elicit key neurotransmitters that help enhance learning and memory. (For a detailed list of these neurotransmitters, please see "The Magic of Movement: Exercise's Phenomenal Impact on the Language Learner's Brain," The *ITBE LINK*, *41*[2], 2013.)

The exercises are not meant to be tiring in any way; rather, they are meant to be fun, inspiring, and refreshing. I may create variations of these based on the mood of the class, or I might vary them based on a particular request from a student. Like all routines, I find it important to be "consistent yet quirky." That is, the consistent routines of exercise nurture a unique kind of comfort for the students, while the quirky changes in the routine foster an excitement generated by the changes and the particular nuances of the variations. The four core pre-glass exercises are as follows:

(1) the happy hall & clever classroom walk
(these are essentially brisk walks in the hall or in the classroom done for one to three minutes; when we do them in the classroom, we often simultaneously review the previous class's vocabulary terms);

(2) sweet and simple T'ai-chi variations
(for an example of these go to http://www.youtube.com/watch?v=E65StVJTzVU);

(3) the nifty knees & jumping jack jamboree activity
(this exercise is basically a combination of knee lifts followed by jumping jacks and then concluding with more knee lifts); and

(4) blissful big breaths
(these are focused breathing exercises meant to increase the oxygen flow to the brain).

2. *During-Class Exercises*

Pre-class exercises are vital for nurturing a focused mind (Winter et al., 2007); however, recent research is also starting to support the idea of exercising *while* learning. Schmidt-Kassow et al. (2013) showed how exercising at a slow pace while simultaneously learning vocabulary significantly increased the participants' long-term retention of the lexical items.

Eric Jensen (2008) is also an advocate of active classes for increased learning. He reminds teachers to get their students up and moving every 20 minutes for optimal focus and attention while studying. If we reflect on this for a moment, it makes complete sense: After a while of sitting down, the heart rate and breathing naturally decrease; consequently, there is less blood and oxygen flow to the brain. Without a healthy oxygen-enriched supply of blood to the brain, the necessary neurotransmitters that help students attend to information and form memories of it are not elicited. In short, physical activity is a must before and during the learning process.

Moreover, the good news is that one need not run a marathon to benefit from exercise. It turns out that just a little exercise has substantial benefits (Medina, 2009). So, simple exercises done during class will help our students maintain the needed mental health to encode, learn, and retain the vocabulary.

There are four frequent during-class exercises I promote. I have listed these below with a brief explanation of each:

(1) exercise stations
(this is a designated area of the classroom [usually the back] where students can go to exercise or stretch when they feel the need);

(2) stand and deliver
(whenever possible, I have my students stand to answer questions);

(3) the class clap—the music of motivation
(I use this when a student offers a good answer, I have the others clap for him/her and give praise); and

(4) mimicking gestures
(I request the students to mimic the gestures that I match to the vocabulary terms we study).

(For details on the pre- and during-class exercises, please see "Physical Exercises that Boost Brainpower in the ELL Classroom, Part II," *College ESL Quarterly,* Spring 2016.)

3. *Physical Gestures and Facial Expressions*

Physical gestures and facial expressions are an integral part of the Head-to-Toe Method for a number of reasons, stretching from the need to get the body physically involved with learning to keeping the mind awake through a sudden boost of oxygen. In addition, various publications on how gestures and facial expressions help our students acquire new material in the classroom are widespread.

The research on the correlation of gestures and speech (McNeill, 1992), gestures and learning (Goldin-Meadow, Nusbaum, Kelly, & Wagner, 2001), gestures and language acquisition (Kelly, Manning, & Rodak, 2008), and facial expressions and learning (Knapp & Hall, 2006) not only supports the use of gestures and facial

> expressions in teaching, but argues that they are imperative ingredients in the learning process. (Randolph, 2014, para. 1)

Typically, I use both physical gestures and facial expressions during three crucial times in a lesson: (1) during the initial encoding of the terms, (2) at mid-lesson for a review of the terms, and (3) at the end of class as a final quick review. So, for example, let's say I teach the term "juxtapose." I will use my shoulders, arms, and hands to show the comparing or contrasting of two things; my eyes may dart back and forth to parallel the notion of comparing or contrasting, and lastly I might exhibit a smile or a serious look of interest on my face. Then, later in the lesson, I will ask the students, "What am I doing?" as I gesture and facially express a term. They will respond by giving the vocabulary item and its definition. At the end of the lesson, I will repeat this as a review if time allows. This three-time exposure to the vocabulary terms, reinforced by the physical gestures and facial expressions, helps encode the lexical items at a deep level and introduces the students to a more concrete way of learning the abstract vocabulary. (For a detailed discussion of the kinds of gestures and facial expressions used in my classes and student responses to these, please see "Giving a Nod to Gestures and Facial Expressions: Helping ELLs Encode Lexical Items," *CATESOL News, 46*[3], 2014).

4. *Pair Gesture Quizzes*

Pair gesture quizzes are body-based review sessions that focus on the learned vocabulary; the terms reviewed may be recent or from earlier in the term, or both. One fundamental aspect of the Head-to-Toe Method is that all terms get reviewed on a frequent basis.

I use these pair gesture quizzes as student-centered review sessions at the beginning of a class. First, I have the students pair up. Next, I hand out a list of 10-15 terms to review. Then, I have one student create a gesture with a facial expression that corresponds to a term, and his/her partner guesses which term is being expressed. After correctly answering/guessing the "gestured term," the same partner then offers a definition of the term and creates an original example sentence using the term. These pair gesture quizzes are effective sessions because they incorporate both the mind and the body in learning, and they help blend prior and current knowledge together for a better understanding of the terms.

5. *Embodied Cognition & Embodied Semantics*

Embodied cognition and *embodied semantics* are two very powerful concepts I have borrowed from neuroscience and psychology that also help turn abstract vocabulary terms into concrete ones. Essentially, these two ideas—embodied cognition and embodied semantics—help students associate and tie language to their own bodies. This notion is supported by research done in Lisa Aziz-Zadeh's lab. Based on her work, concerning reading and the brain, Aziz-Zadeh "describes our language faculty as 'intrinsically tied to the flesh'" (as cited in Iacoboni, 2009, p. 95).

Embodied Cognition can be defined as

> the reality that (a) the mind and the body are tightly connected and influence each other (McNerney, 2011); and that (b) the body and the physical environment affect the brain and its cognitive processes; and consequently, (c) the brain, mind, and body work together to perceive, act on, and understand the world (Thompson, 2012; Varela, Thompson, & Rosch, 1991). (Randolph, 2016b, para.7)

I employ this component by having students make connections with lexical items and specific regions or parts of the body. For example, when I teach the word "juxtapose," I ask the students, "What body association do you make with this verb?" Common responses that students have made are "hands," "arms," "shoulders," "eyes," or "the brain" (Randolph, 2015). These are the body parts or the organs that students immediately associate with when comparing or contrasting two things. The fact that the responses come almost as fast as the question is delivered shows that the connection is highly visceral and immediate. Again, Aziz-Zadeh's comment that language is "tied to the flesh" rings true here in a very profound way.

The idea of embodied semantics is also strongly linked to how the brain processes and reacts to words and actions. In their article, "Embodied Semantics for Actions: Findings from Functional Brain Imaging," Aziz-Zadeh and Damasio (2008) explain that the notion of embodied semantics seems to illustrate that the motor regions of the brain that actually cause an action to happen are the same regions that the brain uses to conceptualize that very action. "For example, the concept of 'grasping' would be represented in sensory-motor areas that represent grasping actions; the concept of 'kicking' would be represented by sensory-motor areas that control kicking actions" (p. 1).

The research on embodied semantics has been limited to action-related lexical items like verbs (e.g., kick, grasp, and hold) or action-related nouns (e.g., foot, hand, and mouth). No known research has been done on action-related adjectives like "fast" or "slow," or action-related adverbs like "quickly" or "repetitively," but perhaps similar findings would occur as all of these deal, in one way or another, with action-related activities or concepts.

To reinforce neural-connections related to lexical item acquisition, I apply the concept of embodied semantics in the following way. First, I ask the students to repeat the lexical item aloud, for example "whisper." Next, I have them *imagine* a scene using the word (e.g., one person whispering something to another). Then, I ask that they tell their neighbor what they imagined (e.g., "I saw a man whisper 'I love you' to his wife"). Essentially, what they are doing here is naturally creating an example sentence using the lexical item and tapping into the sensory-motor area of their brains. To make this particular exercise even more effective, they could actually "whisper" it to their partners, reinforcing the reality and concept of the term, which would help transfer it to the students' long-term memory. As we can see from this activity, I am getting the students to consciously make connections on one level while their brains are internalizing and reacting to the activity on another level. Here, the conscious and unconscious come together to fix the terms in their neural networks.

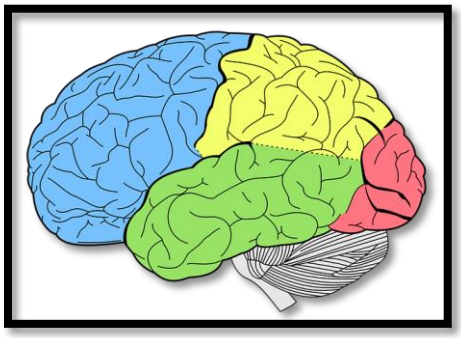
6. *Sports Associations*

The sports associations component is relatively fun and straightforward. I simply ask the students what sport they associate with the particular term we are studying. The students can either give general responses or specific ones. Specific responses, I think, are better because they will most likely have a relation to the students' personal histories. I have divided the various sports into five major categories: (1) finesse sports (e.g., gymnastics, figure skating); (2) contact sports (e.g., American football, rugby); (3) endurance sports (e.g., long-distance cycling, running); (4) single player sports (e.g., bowling, golf); and (5) team sports (e.g., basketball, soccer). So, for example, when I ask the students what sport they associate with the word "elegant," they often respond with "figure skating" or "gymnastics" (i.e., finesse sports). When I ask what sport they associate with the idiom "burn the midnight oil," they often say "long-distance running" or "long-distance cycling." On the following page (see Table 1) is a set of examples we have used for the lexical items associated with the five categories of sports and examples of specific sports.

Table 1
Lexical Items and Sports Associations

Lexical Item Examples	Categories of Sports	Examples of Specific Sports
elegant, meticulous	(1) finesse sports	gymnastics, figure skating
run into, thud	(2) contact sports	American football, rugby
burn the midnight oil, longevity	(3) endurance sports	long-distance cycling, running
lonely, solitude	(4) single player sports	bowling, golf
collaborate, warm up to	(5) team sports	basketball, soccer

7. *Brain Region/Part Associations*



I have found that students particularly enjoy this component because it not only helps them make vivid associations, but it also helps them familiarize themselves with the various regions/parts and functions of the brain. Before I implement this component, however, I go over the main parts of the brain that we will use. These include the following:

the frontal lobe (this deals with attention, planning, and decision making)
the occipital lobe (this primarily deals with vision)
the parietal lobe (this deals with sensations like temperature, taste, and touch)
the temporal lobe (this deals with auditory perception, language comprehension, and visual memories)
the amygdala (this deals with emotions, survival instincts, memory, and motivation)
the hippocampus (this deals with learning, memory, and spatial navigation) and
neurons (these deal with communicating information)

During the course of a semester, the students become very well-versed in these regions and will be able to make precise associations with lexical items and the various parts of the brain. Below (see Table 2) are examples we have used in recent classes. I should also mention that the students will justify why they associate a particular term with the particular part of the brain. These justifications help reinforce deep, concrete meanings for the lexical items, and they also make it fun for the students.

Table 2
Lexical Items and Brain Associations

Lexical Item	Brain Part	Justification
analyze, juxtapose	the frontal lobe	deals with decision making
sunset, transparent	the occipital lobe	deals with sight
delicious, humid	the parietal lobe	deals with taste, temperature
symphony, whisper	the temporal lobe	deals with sound
nostalgia, walk on air	the amygdala	deals with memory, emotion
hit the books, look back on	the hippocampus	deals with learning
be up on, communicative	neurons	deals with communication

III. Concluding Remarks

In Shakespeare's play, *All's Well That Ends Well*, the character, Lafew, tells a sickly King of France, "I have seen a medicine that's able to breathe life into a stone, quicken a rock, and make you dance canary" (Act 2, Scene 1, 72-78). I too "have seen a medicine that's able to breathe life into a stone," and that medicine is the body-based components of my Head-to-Toe Method. The whole notion of physical exercise is pivotal in getting students up and moving before class in order to prepare their minds to take in and actively attend to the new vocabulary terms. Moreover, this active component acts as an effective catalyst in readying the students to use both their bodies (e.g., the gestures and the gesture quizzes) and their minds (e.g., making associations with the lexical items and their bodies and brains) as they forge permanent connections in their neural webbing that will help them acquire a profound intuitive feeling for and helpful understanding of English vocabulary.

References

Aziz-Zadeh, L., & Damasio, A. (2008). Embodied semantics for actions: Findings from functional brain imaging. *Journal of Physiology,* 1-5. doi: 10.1016/ j.physparis.2008.03.12

Eagleman, D. M. (2015). *The brain.* New York, NY: Pantheon Books.

Eagleman, D. M. (2011). *Incognito: The secret lives of the brain.* New York, NY: Pantheon Books.

Goldin-Meadow, S., Nusbaum, H., Kelly, S. D., & Wagner, S. (2001). Explaining math: Gesturing lightens the load. *Psychological Science, 12,* 516-522.

Iacoboni, M. (2009). *Mirroring people: The science of empathy and how we connect with others.* New York, NY: Picador.

Jensen, E. (2008). *Brain-based learning: The new paradigm of teaching.* Thousand Oaks, CA: Corwin Press.

Kelly, D. S., Manning, S. M., & Rodak, S. (2008). Gesture gives a hand to language and learning: Perspectives from cognitive neuroscience, developmental psychology and education. *Language and Linguistics Compass, 2,* 1-20. doi:10.1111/j. 1749-818×2008.00067.x

Knapp, M., & Hall, J. (2006). *Nonverbal communication in human interaction.* Belmont, CA: Thomson Wadsworth.

McNeill, D. (1992). *Hand and mind: What gestures reveal about thought.* Chicago, IL: University of Chicago Press.

McNerney, S. (2011, November 4). A brief guide to embodied cognition: Why you are not your brain. *Scientific American.* Retrieved from blogs.scientificamerican.com/guest-blog/a-brief-guide-to-embodied-cognition-why-you-are-not-your-brain/

Medina, J. (2009). *Brain rules: 12 principles for surviving and thriving at work, home, and school*. Seattle, WA: Pear Press.

Randolph, P.T. (2016a). Physical exercises that boost brainpower in the ELL classroom, Part II. *College ESL Quarterly, Spring 2016,* 1-8.

Randolph, P.T. (2016b). Applying elements of embodied cognition of ELL Poetry Read-a-Thons. *CATESOL News, 48*(3).

Randolph, P.T. (2015). Getting physical: Making connections between the body and vocabulary. *CATESOL News, 47(3).*

Randolph, P.T. (2014). Giving a nod to gestures and facial expressions: Helping ELLs encode lexical items. *CATESOL News, 46*(3).

Randolph, P.T. (2013). The magic of movement: Exercise's phenomenal impact on the language learner's brain. The *ITBE LINK*, *41*(2).

Ratey, J.J., & Hagerman, E. (2010). *Spark! How exercise will improve the performance of your brain*. London, England: Quercus.

Reynolds, G. (2012, April 18). How exercise could lead to a better brain. *New York Times*. Retrieved from www.nytimes.com/2012/04/22/magazine/how-exercise-could-lead-to-a-better-brain.html

Schmidt-Kassow, M., Deusser, M., Thiel, C., Otterbein, S., Montag, C., Reuter, M., Banzer, W., & Kaiser, J. (2013). Physical exercise during encoding improves vocabulary learning in young female adults: A neuroendocrinological study. *PLOS ONE, 8*(5). doi: 10.1371/journal.pone. 0064172

Sousa, D.A. (2011). *How the brain learns.* Thousand Oaks, CA: Corwin/Sage.

Thompson, J. (2012, February 20). Embodied cognition: What it is and why it's important. *Psychology Today.* Retrieved from https://www.psychologytoday.com/blog/beyond-words/201202/embodied-cognition-what-it-is-why-its-important

Varela, F. J., Thompson, E., & Rosch, E. (1991). *The embodied mind.* Cambridge, MA: The MIT Press.

Willis, J. (2006). *Research-based strategies to ignite student learning: Insights from a neurologist and classroom teacher*. Alexandria, VA: Association for Supervision and Curriculum Development.

Winter, B., Breitenstein, C., Mooren, F.C., Voelker, K., Fobker, M., Lechtermann, A., Krueger, K., Fromme, A., Korsukewitz, C., Floel, A., & Knecht, S. (2007). High impact running improves learning. *Neurobiology of Learning and Memory, 87,* 597–609.

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