

Neuroplasticity: Training the Brain while Training the Body

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When considering our “active aging” population, it is so essential to consider more than just the physicality of the body. Of course, we want to focus on activities of daily living, a healthy body composition, and movements that keep us young and active, but what we also must consider is the mind body connection and the topic of neuroplasticity. As we age our brain begins to deteriorate as well, resulting in potentially permanent impairment, functional disability, and even personality changes. Given this information, it is our duty as coaches for this population to find ways to “retrain” the brain and allow our participants to achieve not only physical goals but also enhance their lives through brain training. WATERinMOTION Platinum is committed to giving our instructors the information they need to make the most of every WATERinMOTION class they instruct!

The original term “plasticity” regarding brain training dates back to William James in his Principles of Psychology in 1890, and lately it has evolved to the full term “neuroplasticity,” referring to training the brain as if it were a muscle while applying similar fitness concepts of adaptation, sets, repetitions, timed performance, and specificity (Ferris). Today, recent research tells us about the importance of neuroplasticity training combined with physical movement skills to strengthen, improve, and even change some brain regions (Adams, Reynolds). Furthermore, research reveals how training the brain’s different capacities can help manage anger, fear, and depression (Begley), and serve as a viable complement and sometimes alternative to interventional brain medication (Doidge).

Neuroplasticity training often involves an approach that fuses a mental and physical component. While many approaches exist, the starting point involves merely understanding the different types of tasks that the brain can do while engaged in movement. Finding and coupling appropriate types of brain games with appropriate movements continues to be one of the waves of the future for helping ourselves to change, not that we age but how we age (Howard).

A basic understanding of new research-based findings can help everyone understand what both contributes to, and detracts from, optimal activities of daily life brain function. Everyone will prefer some brain games over others because, like people favor certain muscles and muscle groups, we favor certain brain functions. Some people prefer doing left-brain mathematical puzzles like Sudoku, for example, while others prefer right-brain crossword puzzles. It proves necessary, then, to be sure to include brain games using all different brain areas to offer well-rounded training just as no trainer or instructor today would train a muscle group without considering the muscle group that opposes it.

Neuroplasticity Training Implementation: The Body Must Move!

An approach of right-and-left-brain training draws upon mental tasks that require different sides of the brain to function in an undulating format combined with simultaneous physical tasks. To be considered neuroplastic training, the mental tasks need to occur during simultaneous physical tasks as well (Fleshner). To be sure, the body's movement does not have to be intense but must involve some form of coordinated movement.

For example, asking a client to execute any type of brain skill, even having a client seated doing Sudoku puzzles, for example, may indeed be working a particular area of the brain (left half for math skills) but such activity does not constitute neuroplastic training because physical movement must accompany the brain's task. Therefore, unlike sitting comfortably, making even a small change to sit on the edge of a chair and do toe taps while trying the puzzles would immediately constitute neuroplasticity training because of the combination of mental work with some component of physical movement.

Anyone who has ever needed to engage in even a moderately challenging brain skill while walking and talking, such as recalling a childhood memory or finishing a complicated math skill with no paper handy, will recall how much easier it becomes to stop and think. Stopping the body's movement serves as way to decrease the sensory input to the brain and allow it to concentrate on its other processes such as math or memory. While that may prove more comfortable, it does not make for neuroplasticity training because the point is to encourage the brain to function simultaneously with the body's needs just as required in life. Remember to choose and adapt the appropriate level of physical movement for client(s) to accompany any of the suggestions outlaid here. For brain training, the point is not the intensity of the body's movement but that the body must be engaging in movement in the first place.

Neuroplasticity General Guidelines

- Neuroplasticity occurs with movement.
- Choose the most appropriate mental tasks that ideally undulate between right and left-brain skills.
- Drills work best when done in one's strongest language.
- Most games come with timed suggestions, so try to follow those closely. For example, counting from 1 to 50 in increments of 7 digits may prove easy but having to reach the number 50 in 20 seconds or less adds an additional layer of difficulty.
- When using amounts of objects, the research agrees that the most desired number is 7 (Glazener).

Common Examples

Riddle: For problem-solving, we will recommend incorporating one major riddle per class and try to prolong the brain process until someone solves the riddle or the instructor gives the solution at the end of class. Riddles work short-to-long-term memory, problem-solving, and help integrate both sides of the brain during movement. Refer to Appendix A for Riddle Ideas.

Conversation Example: “What did you have for dinner last night?” seems an innocuous question between friends. The answer depends on one’s ability to use a certain amount of memory but this does not constitute neuroplasticity training. However, asking each other to list in reverse order what he or she ate for dinner the previous night while walking their pets during an evening stroll constitutes neuroplasticity training for two reasons. First, the task requires the mind to work simultaneously with the body engaged in a movement skill. Secondly, and more specifically, the memory-recall and spatial skills of reverse order come from left-brain tasks.

Lunge Example: Another common example could include the more traditional fitness training movement of alternating fitness forward lunges. Try to make a list alternating between fruits and vegetables while doing alternating forward lunges. Lunging forward with the left leg, say “broccoli,” for example, and then, when lunging forward with the right leg, say “pineapple.” Continue this process of making a list of vegetables with the left leg and a list of fruits with the right leg. This constitutes neuroplasticity training because the mind works while the body engages in physical activity. The problem-solving (making two simultaneous-yet alternating-lists while alternating between fruits and vegetables without stopping) taxes the brain with right-brain tasks and the physical movement coordination is a left-brain task.

WATERinMOTION Platinum Specific Neuroplasticity Training

A neuroplasticity drill will be incorporated into each WATERinMOTION Platinum Release beginning with Release 14. It will be during track 5. The drill will involve simple physical movement and a brain training task. Always keep the focus of brain training on your clients’ success and avoid drills that create competitiveness. Be encouraging and enthusiastic when introducing and leading neuroplasticity drills.

The addition of neuroplasticity training into Platinum will further serve our clients and set Platinum apart from other programs for active agers.

Appendix A

Riddles Ideas for Class

You have a barrel of oil and you need to measure out just one gallon. How do you do this if you only have a three-gallon container and a five-gallon container?

Answer: Fill the 3-gallon container with oil and pour it into the 5-gallon container. Then fill the 3-gallon container again and use it to fill the 5-gallon container the rest of the way. Out of the 3-gallon oil, 2-gallon will be required to fill the 5-gallon container completely. Hence one gallon will be left in the 3-gallon container.

Arnold Schwarzenegger has a big one. Michael J Fox has a small one. Madonna doesn't have one. The pope has one but he never uses it. Bill Clinton has one and he uses it all the time! What is it?

Answer: A Surname

If your sock drawer has 6 black socks, 4 brown socks, 8 white socks and 2 tan socks, how many socks would you have to pull out in the dark to be sure you had a matching pair?

Answer: Five. There are only four colors, so five socks guarantee that two will be the same color.

A large truck is crossing a bridge one mile long. The bridge can only hold 14,000 lbs, which is the exact weight of the truck. The truck makes it half way across the bridge and stops. A bird lands on the truck. Does the bridge collapse?

Answer: No, it does not collapse since it has driven a half mile - you would subtract the gas used from the total weight of the truck.

Mom and Dad have four daughters and each daughter has one brother. How many people are in the family?

Answer: Seven, the four daughters have only one brother, making five children, plus mom and dad.

What English word retains the same pronunciation even after you take away four of its five letters?

Answer: Queue

Why wasn't Bertha put in jail after killing dozens of people? Answer:

Answer: She was a hurricane.

If I say "Everything I tell you is a lie," am I telling you the truth or a lie?

Answer: A lie, since the statement itself says that everything told will be a lie.

How did Mark legally marry three women in Michigan without divorcing any of them, becoming legally separated or any of them dying?

Answer: It's a part of his job - he's a justice of the peace.

While exploring the wild highlands of Ireland, Robert was captured by goblins. Grumpy, the chief of the goblins, told him he was allowed one final statement on which would hinge how he would die. If the statement he made was false, he would be boiled in water. If the statement were true, he would be fried in oil. Since Robert did not like either option, he made a statement that forced the goblins to release him. What is the one statement he could make to save himself?

Answer: Robert said: "You will boil me in water." The goblins were faced with a dilemma. If they boiled him in water his statement would be true, which means he should have been fried in oil. They can only fry him in oil if he makes a true statement, but if they do, it would make his final statement false. The fairies had no way out of their situation so they were forced to set Robert free.

Appendix B

Individual Neuroplasticity Skills & Drills Examples:

Incorporate the following into the skills above as participants become familiar with the moves needing minimal cueing.

- A. Spell your first name forwards (short term memory, problem solving skills)

- B. Spell your first name backwards (spatial skills)
- C. Say the days of the month backwards starting with December skipping one month each time (December, October, August...)
- D. Count down from 100 by 3s (math, problem solving)
- E. Teach them any word in any other language and repeat and spell it 7 times (language skills)
- F. Say out loud (all together) your first memory, your first birthday party, your first kiss, how you met your first friend (long term memory)
- G. Recite the digits of your area code
- H. Recite the digits backwards
- I. Add up the digits, two at a time, and sum a grand total
- J. Spell each digit forwards
- K. Spell each digit backwards

Partner Neuroplasticity Skills & Drills Examples:

Phone Number Games with a friend: Part 1

Get into a “holding pattern” of movement with a friend, which can range from simple seated marching to more involved standing marching, grapevines and squats. One of you is “friend A” and the other is “friend 1.” Friend A tells Friend1 the last 4 digits of his or her phone number. Start to play the following games:

- Recite the digits

- Recite the digits backwards
- Add up the digits, two at a time, and sum a grand total
- Spell each digit forwards
- Spell each digit backwards

Repeat the above for up to four minutes, as appropriate, and then change roles.

Phone Number Games with a friend: Part 2

After ten minutes, start completely different movement skills, repeat the above games, adding the first 3 digits of the phone number to the existing 4 digits, for a total of 7 digits to play with in the game. Continue with this method until you can execute some or all of the above sections of the game. As a progression in that session or in future sessions, add the area code (for a total of 10 digits) and repeat playing all games as above. Whenever you find yourself tempted to pause and think, encourage the other to “keep moving and keep thinking” to emphasize the two simultaneous components of neuroplasticity training.

Conversation Games with a friend

“Walkie-Talkie” for memory and spatial skills adding social age training March in place while holding the hand of a partner. The leader asks questions and guides the walking or marching in place changing directions as appropriate to create a physical and mental challenge. Questions should involve both long and short-term memory answers. After 3-5 minutes, change roles if appropriate. The purpose is to couple movement with verbal-dependent exercises. In addition to listening to the answers, use the client’s breath during the response as a measure of the talk-test to assess the client’s effort level.

Conversation Examples for “Walkie-Talkie”

One of you is “Friend A” and the other is “Friend 1.” Sample questions for “Friend A” to ask “Friend 1.”

- Tell me about one of the most significant days in your life
- How did you hear the news about September 11?

- Can you tell me a few things about the first love of your life?
- What is something you have done that you are most proud of?
- What is something that a teacher has taught you that has stayed with you for many years?
- What is your favorite Starbucks drink and why?

As one becomes more comfortable with neuroplasticity skills and drills, the following sample scripts for clients or classes will seem easier and possible:

Starting Script for Conversation Training

The Name Game with a friend Part 1: What Did You Eat?

Friend A: "Hi, Connie. Let's play some brain games. Can you try to tell me what you had for dinner last night in order, and I promise not to judge what you tell me, just to use the words you tell me."

[Friend 1 answers].

Friend A: "Great. Can you now list those same items in backwards order?" [Friend 1 answers].

Friend A: "Awesome. Can you now list those items in forward order again but spelling out each of those items?"

[Friend 1 answers].

Friend A: "Good. Take the last item you mentioned and please spell it backwards."

[Friend 1 answers].

Friend A: "Fantastic. Now take one other food item you mentioned and spell it backwards."

Change roles while continuing movement.

The Name Game with a friend, Part 2: Groceries

Friend A: Now for something different, let's talk about what we have to buy at the grocery store the next time we go. Can you name one item?

[Friend 1 says "Bread"]

Friend A: "Good. 'Bread' And I'll add "Strawberries."

[Friend 1 repeats "'Bread and Strawberries.' And I'll add Sweet Potatoes"].

Continue in this way until having a list of 7 food or grocery items. Before finishing the game, see how well you each can name the items in forwards and reverse order.

Be encouraging of each other. If you find any section of a game to difficult, ask for assistance or skip that section.

Using Visual Aids and Equipment

Visual aids (printed papers and actual objects) also can serve as games to train both sides of the brain. Remember that the caveat for this to work means that you must be able to have at least one hand free to hold the visual aid while engaging the body in some form of movement.

Visual Game using Objects Object Recall Game 1

Have 7 easily identifiable objects hidden and slowly reveal them, one by one, forming a line across the floor or table. After leaving the objects undisturbed for 30 to sixty seconds, return the objects back into their concealed area, in the same order they came out.

Rules: While marching or moving in place, notice 7 objects you can see in visual proximity, such as a stationary clock. Then add an object and repeat the object list from the start. Continue in this format until you have recited up to 7 objects and engage in recall both forwards and then backwards. Then close your eyes and repeat naming the objects. Suggestions for 7 easily-identifiable objects that work well for this game at home in the living room could be a clock, television, remote control, window, rug, coffee mug and telephone.

Appendix C

Coordination Skills & Drills Examples:

- A. Pretend to pinch your nose with your right hand. Simultaneously pretend to pinch the cartilage of your right ear with your left hand. When the AAMC coach says “switch,” change positions, you will pretend to pinch your nose
- B. Take the L arm overhead and down by your left side. Repeat this pattern slowly but consistently. When the L arm is at your side, take the R arm overhead and then take it out to the side (perpendicular to the body) as the L arm goes overhead. Repeat this movement several times so the L arm’s movement remains the same and the R arm’s movement remains the same. After a minute, change sides.
- C. Pat the top of the head gently with the R hand while rubbing the abdominal core area with the L hand for 30 seconds. Now, gently pat the abdominal core area with the L hand and make small circles with the R hand on the top of the head for 30 seconds. (Try NOT to make circles when you pat the abdominal area). Now, switch hand assignments.

Appendix D

Social Skills Protocol:

- A. No Social Skill should take more than four minutes.
- B. AAMC should let everyone know when TWO minutes remain.
- C. After finishing the task, or when time is up, each participant returns to his spot and reports back if called.
- D. Class size permitting: “As we play more social skills, you can never interview the same person today more than once.”
- E. Instructors should encourage “cooperation, not competition,” and be mindful of the groups as sometimes this population can prove “clique-ish” and many times friends will interview only friends each time.

Social Skills and Drills Examples:

1. Walk around to interview all the people you can find who had some type of eggs for breakfast this morning and remember their first names.
2. Walk around to interview all the people you can find who share your Zodiac sign and remember their first names.
3. Walk around to interview all the people you can find who were born in the same month as you and remember their first names.
4. Walk around to interview all the people you can find whose favorite color is the same as yours and remember their first names.
5. Ask three people what is the main name in their street address and remember these three words.
6. Walk around to interview three people about how they take their coffee or tea and remember this and their first names.
7. Ask three people what their favorite song, movie, play or book of all time is and remember their answer and their first name.
8. Ask three people who the most famous person is that they have

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