Motor learning is representative of a process in which functional mobility is reproduced in varied settings. The process of learning occurs in multiple cortical locations such as the hippo-campus and basal ganglia. Stroke easily damages oxygen supply to these portions of the brain, damaging the learning process. It is imperative that we understand how to teach our patients in a way that instills long-term memory, reproducing performance in diverse conditions. Yet, we have a tendency as therapists to prescribe repetition with minor variation in our home programs.\textsuperscript{1-2}

Neurodevelopmental Treatment (NDT) and evidenced-based medicine clearly state that our patients must practice in varied settings for the best success, but this is easier said than done. How do we prescribe home programs to our patients under this functional NDT model with varied learning opportunities? We are called in this approach to think beyond sets of ten, yet explaining this to the patient is challenging.

I have had the pleasure of caring for Mrs. Hartmann, a middle-aged woman post stroke, in our outpatient facility. She had served as an elementary school teacher for numerous years. Her stroke occurred nine years prior to her seeing me in the clinic. She presented with the motivation and will to try therapy again in efforts to be able to walk in the grocery store with less reliance upon her husband. Her presentation is made complex by the severe chronicity of her condition, spasticity, homonymous hemianopsia, and impaired speech. Mrs. Hartmann participated with NDT-approached therapy well and began to improve. I had varied the setting constantly with each activity. She was embarking on a journey to relearning the skill of holding objects and walking with a grocery cart. Yet her right ankle stability remained poor, and her spasticity remained severe. It was impossible for her and her husband to replicate what was done in the clinic at home without falling. She experienced multiple falls at home with one instance that caused facial bruising.

My goal of returning her to the grocery store with less fall risk persisted; however, I did not understand how to balance the intensity, functionality, and practicality of her home activity program. I found that the system used in our clinic for print exercise pictures for home programs
was less than useful for her condition. None of the pictures represented what I had been doing with her. I initially resorted to artistry with a blank canvas, yet soon remembered why I did not pursue a degree in liberal arts. I needed guidance on how to aid her practice at home while maintaining varied settings and safety.

The next educational tool was to demonstrate to the family and patient the closed chain environment. This allowed the patient to participate with ankle strength and stretching with less fear of falling. I still struggled with seeing our fellow orthopedic patients getting nice pictures of what they should do at home while I was trying to draw or verbally paint a picture for my population post stroke. Mrs. Hartmann and her husband blessed me with a motivated attitude. They became an open book, ready to be permeated with any information they could find.

I learned from Mrs. Hartmann that a home program does not need to look prestigious to be effective. It also does not and should not only encompass sets of ten. I couldn’t just select some familiar exercise pictures from a generated list. I had to be more creative and specific to her goal. The moment I penciled in time for home program development into the treatment session is the moment Mrs. Hartmann and I became on the same page. Initially, I devoted much effort and time to targeting the correct specific muscular impairment, but this can never be resolved rapidly unless it is also addressed at home. I had given home programs to her, yet I had only jotted down some information on one of the prior treatment strategies at the end. I soon realized that I could not expect my patient to replicate what I had done when she was at home.

Varying the setting can commonly include adaptation of the following: set-up, action, tools, and feedback. The tool aspect is solely dictated by the patient’s goal. It has become evident to me that the tool should be what the patient varies at home. The therapist can build a home program by prescribing the correct set-up and action. The feedback can then come when the patient returns to the clinic. Mrs. Hartmann benefitted from the closed chain activity initially with actions in the sagittal plane to stretch the soleus and biceps brachii musculature. I found that I could write instructions as to how this is set up in their home and give her the power to decide what functional tool she used in the contralateral arm to lead her body into the stretch desired. Activities utilized to engage muscular stretches included shuffle board, placing items in a grocery cart, and carrying an item like a purse. Each of these functional activities could easily service as a portal to a successful stretch, maintain patient engagement, and continue the journey toward neuroplasticity. She and her husband creatively decided to use their shuffle board in their garage to play a game together while practicing the instructed stretch or

I also educated her on how balance represents the sum of the base and body alignment. This helped me to explain how her right upper extremity had to be incorporated into gait training. It allowed me to introduce an object like a purse to carry while she walked. I demonstrated to her how this worked by taking a video of her ambulation. Seeing the smile on her face when she noticed that there was hope in carrying her purse with her paretic arm was priceless. I educated her that she could walk at home without the brace or cane if she walked forward with her husband there for safety. This was a way to ensure the set-up of sagittal motion while allowing her to dictate what tool/object she held in the right hand (NDT/Bobath Certificate Course in the Management of Adults with Stroke and Brain Injury. Houston, TX. April – August 2016. Neuro-developmental Treatment Association. www.ndta.org).

Mrs. Hartmann has reduced her number of falls and has been able to walk in the grocery store with little assist and without an ankle orthotic. She taught me how the power of motivation and salience can overcome many impairments post stroke no matter how chronic they are.

Prescribing her a home activity program has taught me humility, creativity, and altruism. I sometimes have the tendency to begin a given activity and task that is too difficult for her to reproduce at home. It was necessary for me to humbly admit that I needed to reevaluate the intensity of the activity and task so that it more appropriately met her level of function to generate a balance between safety and functional progression.

I had been teaching Mrs. Hartmann motor learning via varied settings. It can come as second nature to me to vary the setting in the clinic; however, it is far more difficult to instill enough knowledge into the patient to help them reproduce performance and practice at home. This was especially true for Mrs. Hartmann, given the extensive spasticity present to her upper extremity. I learned that I could use her cane as a means to open her hand and allow an effective stretch. I taught her how to grasp the cane with her paretic hand while performing a functional reach or transfer. This allowed a functional activity with increased lower trapezius force production and a stretch to the wrist flexors.

I also learned the value of altruism. I had to place practicality and function of each activity prescribed over my desire to perfect the set-up for each muscular contraction needed. I realized it is my job to perfect each exercise when she is with me in the clinic, yet it is just as important to
instill confidence in patients, so they can achieve success even when their set-up does not look exactly the same. Their set-up at home can represent a varied setting and further lead to motor learning. Development of her home activity program strengthened me as a therapist while ensuring Mrs. Hartmann obtained the level of function she so greatly desired.

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References

My Story

By Kathy Hartmann

Since I had my stroke almost nine years ago, I have had many therapists. My experience with Ben has been the most extensive and rewarding. It is giving me drive and hope for a better life. When I first started with him, he told me that he thought I could do more and get better. He had me stop wearing my ankle brace and made me concentrate on keeping my foot flat on the floor when walking. It has been very hard to think of all the things I need to do to walk better, but I am working on it.
Ben always makes therapy fun by changing things every time. We use a grocery cart to push around and pick up things from the floor and put them into and out of the cart. I push things around and sweep with a broom while stretching out. Ben helps me keep my attention on the task at hand instead of the stretching. He makes me use my weak side to try to help me with balance, too. He has my leg propped up on a chair while I transfer the broom into the grocery cart with my hand. It causes me pain when my leg is stretched, yet having the task with the broom helps me to keep participating. I am able to focus my attention on getting the job done and less on how the stretch makes me feel. I am also doing some walking without my cane and am getting better at it.

The therapy has helped me do more at home. I can help in the kitchen making meals and also do the dishes and empty the dishwasher. I can wash and dry laundry and fold and hang up clothes if Mike brings them to me. I make the bed now and help with cleaning the home and putting away the clothes. I am trying to do even more chores and find more tasks on my own now.

Since working with Ben, I can go to the store and push a cart and pick up things that I like. I am not very fast yet. I am trying to use my right arm to hold things and carry my purse. I use it at home to carry a bag to put things in that I need to take to another room. It is still very hard to do. I work on my home exercises and activities nearly every day now. I know I am getting stronger and hope I will still get better at walking.

Therapy with Ben also helps me to be able to assist others with similar experiences.