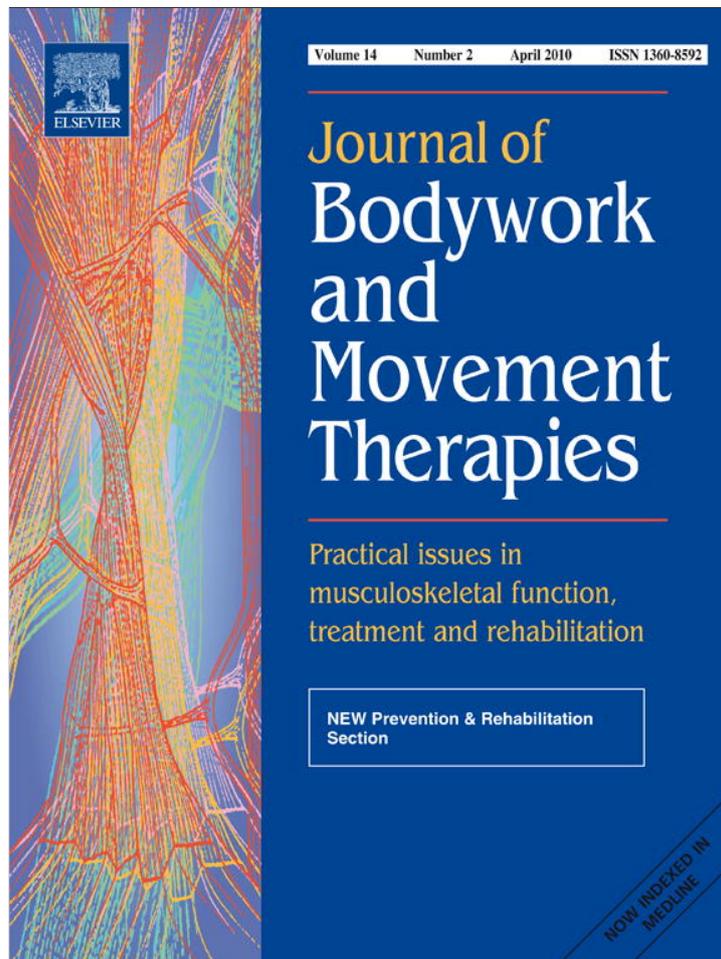


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Bodywork and  
Movement  
Therapies

SPECIAL REPORT: MODIFYING THE EFFECTS OF CEREBRAL PALSY

## Modifying the effects of cerebral palsy: The Gregg Mozgala story

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### KEYWORDS

Rehabilitation;  
Movement therapy;  
Dance;  
Cerebral palsy

**Summary** In response to a news report of the rehabilitation of a New York-based dancer/actor with cerebral palsy, to the point where a ballet performance was scheduled, it was determined that a report based on the individuals involved would be commissioned. The resulting reports from the choreographer responsible for the rehabilitation exercises, and the dancer, were circulated to an interdisciplinary selection of physical medicine experts, for commentary as to what clinicians might learn from the case, and what mechanisms might be involved.

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In early 2008, a young actor with cerebral palsy, Gregg Mozgala, was appearing as Romeo in a *Theater Breaking Through Barriers* production in New York, which involved a mix of actors, some with disabilities and some without. In the audience was choreographer Tamar Rogoff – who decided that she would explore the idea of producing a performance, with this same young man dancing – despite



**Figure 1** Tamar Rogoff during rehabilitation of dancer, Gregg Mozgala ©2009-2010 by LORI GRINKER.

the fact that he was totally untrained, and could not walk without exceptional distortion and effort.

Mozgala has described his walking style at that time as looking like “a human velociraptor.” He walked on his toes, with his lower extremities turned in, wobbling from side to side to maintain balance.

Genzlinger (2009), writing in the New York Times report on the Mozgala/Rogoff story, quotes him as saying:

“My knees were going in, my hips were totally rotated inward. Gravity was just taking me down. So my upper body — arms and chest — overcompensated, curling back and up.”

Some 9 months later, from December 3rd to 20th, Mozgala appeared in New York, in a production (*Diagnosis of a Faun*) choreographed by Rogoff, at the *La Mama Experimental Theater Club*. How was Mozgala able to go from his previous dysfunctional walk, to be able to appear on stage as a dancer?

The early press reports offered only a few clues. It seems that Tamar Rogoff possesses other skills — that do not involve formal training in health care, but which she has acquired over the years of training and directing dancers. The particular methods and approaches that she used with Gregg Mozgala, are described below.

In the text that follows, Tamar Rogoff and Gregg Mozgala describe aspects of the process in their own words.

This is followed by commentaries from experts who were selected from a variety of disciplines.

### Tamar Rogoff

“I began the work in order to prepare Gregg to dance the role of the Faun in a new work I was choreographing. I first saw him as an actor and his body energy called out to me as it was interesting—strong and active and responsive to the text. I liked how his passion ignited and was in direct contradiction to his physical condition. He seemed to act his way out of his c.p. leaving me unaware while watching him do Romeo and Juliet that he had it and I knew he could dance his way beyond it as well.

I used a lifetime of body learning—everything from decades of dance techniques (Ballet-Graham-Bharata Natyam) to bodywork. My bodywork teachers were Allan Wayne and Monica and Harmon Hathaway both of whom taught me ultimately never to listen to them but find my own way. I’ve never studied Feldenkrais or Trager or Alexander or Yoga. For the last 26 years I have given a laboratory class at PS 122 and now at La Mama in New York. Many students have been with me for all these years—they are mostly actors and they agree to being there while I investigate whatever interests me movement-wise—this is an experiential anatomy approach where I can spend a year behind the sternum or the rib cage, for example—then include any landmarks in the body that interest me—bones-joints muscles-spaces between things—the class speaks my idiosyncratic language —alignment issues—mine and theirs often spark investigation. In my class at New York University’s Experimental Theater Wing I add how this investigation can be the origin of a choreographic vocabulary and how it can enliven acting—this is not at all academic, as I haven’t studied the body in an organized course but have picked up information everywhere. I tend to start where I am or from what I see and let the class follow where the body takes us—a class can’t ever be replicated.

The first order of business with Gregg was to steady him enough so he could transcend his main concern which was balance and introduce him to new ways other than his set in stone movement vocabulary which seemed designed to compensate for the inward rotation of his legs and hips He was locked in to a very specific body vise and felt at the mercy of the signals from his brain which were telling him to tense up—we sat on chairs and stamped the feet—I offered imagery—the horse shoe heel—we opened the knees—tucked him into the foetal position which rounded the lumbar spine and changed the curves he needed for balance once standing—introduced opposition walking rather than the seesaw side to side lurch which was the way he got around, and after a few weeks I taught him the shaking technique.

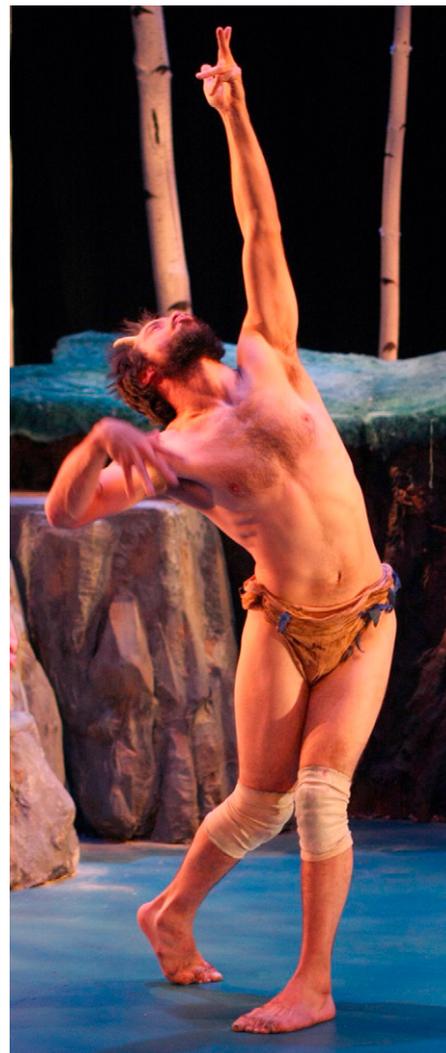
Shaking—we started lying down on the back — legs bent feet on the floor—arms outstretched to the sides—palms up—opening and closing the legs (knees) waiting until involuntary shaking and trembling took over—it took several sessions and ended up starting in thumps of the chest against the floor, the head doing an uncomfortable looking lifting and nodding—all very violent and not where I

was expecting it to come from—each time he lay down the body took off in this same way until it ran its course—any time I put my hand on Gregg's chest I could elucidate a thumping—later came other lightning bolts of zigzag energy—month by month we worked out pattern after pattern—my finger under his lips could cause enormous gagging—his arms pounded the mats—his hands clapped together until they hurt and I had to put something between them—at some point what you might call shaking began—a bit quieter but still intense—thru the thighs and sacrum—then a vibrato took hold of his belly—his stomach muscles had never served him as the way his upper body met his lower was disconnected from the body's original design — then came more pounding, now thru the lumbar—all this we followed as the body led us through. I selected a position from which to start sometimes lying on the back and sometimes on the belly or sitting in a chair—I selected a movement to begin getting us to the involuntary part and then we dedicated an hour or two to follow its course—we were in a gym so we had mats and blocks and everything you might use for yoga—I built him structures to get his pelvis up off of the floor so his legs could be tossed over his chest and his hamstrings could stretch and he could access his stomach muscles—now that his body had experienced the shaking it constantly went to that mode in any stretch.

Standing and hanging over fingers near toes—we used this to stretch out and access the lumbar and open it up—here we got seizing up and a great deal of fear—I bypassed the fear many a time by using my body against his—almost like lending him my nervous system—my sense of flow—throughout I used my body to teach his—he could relax onto me in different ways—the little Reiki I know I used to quiet him as well — my hands sent messages and new patterns—now one sweep of my hand can elicit a 20 min reaction and instill a new or even a permanent understanding—more and more he asks me to move aside as his body is telling him something directly and he must be left alone to follow his internal clues.

Walking—from the beginning he walked at every session and I gave him a small message often connected to an image to take on the street with him—we had to watch his exiting on to the street as he tended to revert to a prior more protective —historically more familiar mode—mostly I just watched his walk and saw where energy didn't flow—where the body was uneven or where the foot didn't touch the floor—as his abilities grew he could feel when his sacrum was rigid or not.

Attitudes — Gregg is now addicted to the way feelings and information come through his body—he's in awe when he feels space in the hip sockets or connections from one place or another—or when he can just slow down—this is a reversal of his former attitude which was a slave to his condition —always taking orders from the Bully (Oliver Sacks' term for the lesion on the brain in C.P.)—always using tons of fast frenetic energy to muscle him through everything from walking to sex—his mind which functioned in a more nuanced way was at odds with the pace and lack of modulation in his body. What he thought in his mind—was not do-able in his body—therefore immense frustration as his hyper-vigilance governed the resonance of his body making known its limitations.



**Figure 2** Gregg Mozgala dancing in "Diagnosis of a Faun". Gregg Dancing ©2009 Julie Lemberger.

Identity—Gregg evolved his personhood —body and mind to fit into his C.P. body—thru that body he felt every emotion and in that body was stored all memories pleasurable and painful—his body rhythms —walking and running were the sound score to his life—the drag of his foot—his particular toe walk—as his alignment changed—his patterns changed and he became a stranger to himself and in fact to me—it was the original walk that housed the person I was interested in—the new neutral was exciting because it proved that change was possible but a bit blah and devoid of any personality—I often noticed when Gregg was drunk, or stoned, that his happiness reverted into the old home base of his original alignment—he reports that when he is being an actor the same happens.

Going forward the questions are:

- How will his new body house him?
- What parts of the changes he's elicited in his body will remain with him irrespective of his actively being conscious of them?
- What amount of consciousness will be necessary to keep a healthier alignment?

- For how long and how much will he have to continue the bodywork process?
- We are planning a phase two of this project which will include bringing another person with C.P. on board so Gregg can both watch me teach and teach this person himself. Will teaching the work keep him involved and help preserve his new patterns?
- How far will we be able to go towards a permanent positive alignment?
- How will Greggs' personality – emotional balance – identity and world view evolve to meet his new needs in his changing body?

### Gregg Mozgala: with cerebral palsy

"I'm sitting on a stool. Tamar is in front of me and has her hands on my feet. She's placing them into proper alignment and pressing my pinkie toes, forever raised like the true aristocrats they are, into the ground. They were caught unawares by the revolution and need to learn what it means to do an honest day's work. Tamar instructs me on how to get my feet into proper alignment. She uses her hands at first to show me the path my foot should travel up and down. She lists all the joints in the foot: heel/talus/ankle/ball/etc... and encourages me to think of the foot in its many pieces as opposed to a heavy, single slab. I ask her to let me try the motion on my own and input the suggestion of the feet as a multi-faceted unit. There's an increase in sensation almost immediately. My body is in conflict with itself. It wants to discover these new routes, new ways of moving, which is actually the way it was originally designed to move, but it takes time and effort to release it from its old modes of behavior. I'm working on my right foot alone. As I focus to raise and lower my foot, I can feel my left leg grabbing in the hip flexor, the knee wanting to turn in, the heel coming off the ground. I stop. I ask Tamar for a yoga block. With my left foot on the block and supported the "bully reflex" is interrupted and I can put all my attention and focus into my right foot. The simple action of raising and lowering my foot takes an incredible amount of focus and is physically strenuous. After a few minutes I am shaking. Not just in my legs, but my entire pelvis starts undulating. All this movement, termed "shaking" is purely involuntary. As my body discovers the correct pathways and what I assume are new neural connections as a result of positive alignment, my body learns that it can utilize these new pathways and release the old mechanism that had previously allowed for standing, hind-limb ambulation, running, jumping and general mobility with the effective, but less efficient, C.P. alignment. What the shaking does is soften my otherwise tense or spastic musculature to receive basic instructions such as; point your sternum down, tuck your tailbone under, close the front ribs/open the back ribs, etc. What's more, as my right leg and entire right side begins to learn proper alignment my resting leg begins to respond similarly. Not nearly with the same intensity, but it's as if one side is teaching the other- like a game of "Follow the Leader." As my body reroutes I often times also experience a physiological—emotional response. In this case, I experienced waves of nausea and became

very emotional to the point of tears. Tamar and I never stop or get bogged down with the psychological or emotional ramifications of this. This would kill our progress. We soldier on through. Both of us realize that what's happening when this occurs is that my body is opening up areas that have been previously unavailable or inaccessible for over thirty years. It is what it is, and this too shall pass.

I'd like to digress for a moment here and talk a little bit about my body's relationship with fear. Tamar has said that my hyper-vigilance is due to my body being in a constant state of emergency. I have come to understand this as a constant fear of falling. During some of our most recent studio sessions as I experience release in my lower body, specifically in the leg below the knee, I've noticed that my arms- shoulders, forearms, wrists and hands get extremely tense. I believe this is a compensation that my body does automatically as a protective measure. As I move my pelvis, hips, legs and feet into proper alignment- into an alignment that my body has never felt- my body tenses. This is because I believe IT believes I'm going to fall down. This is a new and fascinating concept to me. I first became aware of my body's fear response during the rehearsal period. The first day I was working on the set piece we affectionately refer to as, "The Rock," I couldn't even sit on it without waves of physical terror coursing through me. I was flanked by Tamar on my left and Sharon, our stage manager, on my right. As I moved around on it and eventually tried to stand up, I held on to them for balance and support. Initially I couldn't stand up on it without their help. My body would tense so much that it would literally drop me to my knees for a more supported base. If they let go of me the waves of terror would return and I would simply ask- or scream or cry out- for one of them to touch me. This simple action both comforted and grounded me. During our opening week of performance I was experiencing so much pain as a result of tension in my hip flexors that I was convinced it was only a matter of time before I was going to injure myself. Tamar stressed the importance of a focused warm-up. As I increased my warm up and internal focus the pain first moved from my left side to my right and then disappeared completely. By the end of the first week of shows it was gone. It didn't return for the remainder of the run. As we work in the studio, I've realized that I can actually counter this fear response by slowing down and convincing my body that it's okay- that it's not in a state of emergency. The grip we call, "The bully reflex" is the grip of fear. If I stay focused and connected to my body as I move into proper alignment, using my mind, I can show my body that there's an alternative to falling that's better, safer, more productive. I'm still working on developing this theory but could this be me willing my body to change?

We work on my right side for a good forty-five minutes to an hour. I'm shaking. I'm gagging. I'm nauseous. I feel great. It's time for me to stand up and walk around to see how my body has integrated these latest changes with movement. Tamar slowly removes my left foot from the block, being careful to place it down on the ground in the proper alignment. I ask to try and replicate what I have just done on my right foot with my left for a few times before I stand up. Tamar acquiesces. My left foot is considerably more rigid and less responsive than my right foot in general. It's harder to lift and place down properly but I manage to do it about half a dozen times before Tamar assists me with standing up. With the first few steps it's

as if my brain has caught fire. My feet are on the floor like never before. I have a roll to my walk that involves the entire foot that I've never utilized until this very moment. It's incredible. I walk for a bit. I allow my body to integrate all the new information we have just fed it. I try to let my new walk walk me. I listen to my body. Before we know it our work has come to an end for the day.

Neither of us had this planned when we arrived at the studio this morning. We never have an agenda. It just happened. This progress with the feet however, would not have been possible if we had not been working so intensively over the last eight to ten months. Tamar and I continue to talk as we change clothes and prepare to reenter the world at large. I have to head to the West Village to rehearse for a reading I am doing later that evening. Before we exit the studio Tamar gives me a few basic directions to carry with me throughout the day. I listen. I try and put them into practice as we climb the studio steps and exit out onto the street. Tamar returns the keys to Teddy at the gym. I cross the street and enter my building. As I enter my apartment and hit the stairs I remind my body of the work we have just done and take each step slowly and deliberately, careful to make sure I am landing half-toe/heel/with the outside of my heel pressing down. As I walk up the steps I think for the first time ever, "I love walking up stairs," as I fight back the urge to throw up in my mouth."

## Invited commentaries

### Stefan Chmelik

The description of the interaction and partnership between Tamar and Gregg is a fascinating insight into the nature of the body-mind. In Traditional Chinese Medicine (TCM) mind, body (and spirit) are regarded as linked and inseparable.

This is reflected in the association between structure, physiology and emotion, often in a circular, non-linear event pattern: in which anything affecting the body will affect the mind, and vice versa.

CP is a profound neurological developmental or trauma-related condition. In TCM this level of pathology is almost always associated with the 'Water element' and the 'Kidney' viscera, as well as the Wood element and the Liver. This requires some interpretation for the Western-trained mind.

The 'Kidneys' have several important areas of association, including foetal development, DNA expression, the spine, the bone marrow and brain. The emotional association is fear and shock. Gregg Mozgala discusses his fear response "Tamar has said that my hyper-vigilance is due to my body being in a constant state of emergency. I have come to understand this as a constant fear of falling."

The 'Liver' is associated with the tendons and sinews and the free flow of energy ('Qi') and blood throughout the body as well as 'Wind' (Feng), the idea of either uncontrolled movement or lack of movement: 'All this movement, termed "shaking" is purely involuntary.' 'What the shaking does is soften my otherwise tense or spastic musculature to receive basic instructions...'

Neurons that fire together, wire together, and by allowing the Qi and Blood to circulate through shaking, a new neural

network is created that seems able to compensate for the dysfunctional messages due to the brain lesions.

### Zachary Comeaux

This is exciting but not surprising. Couple bravery with determination and insightful intuition, and good things can happen.

Many years ago at the Institute for the Achievement of Human Potential, Glen Doman and others formulated a program called patterning, for working with children with cerebral palsy and other congenital conditions disrupting the development of normal locomotion. By passively putting the child through a series of positions replicating the sequence of stages involved in evolving locomotor skills, the children progressed. The process described here reminds me of such treatment.

More recently, with the instrumentation of Functional MRI we have gained an increased appreciation for the role of certain brain centers into the coordination of motion, and its association with cognitive processes, including expectations, body image. In other words, the divide between physical and "psychosomatic" aspects of human behavior is narrowing. Additionally, we have learned that this psychomotor system is plastic, changeable, and that learning is a physical as well as behavioral event.

The case of Rogoff and Mozgala is interesting to me, not simply as an accomplishment, but as a process. Most bodywork disciplines rely heavily on a conceptual base and prescribed routines. Ms Rogoff and her client have approached the challenge of optimizing locomotor function from a phenomenological point of view. It is my long held belief that this is a valid dimension to any bodywork, and is maximized according to the perceptive capacity of the patient and therapist.

An admonition of Dr. Still, the founder of osteopathy, was to "find the unnatural and return it to the natural." Certainly there are standardized criteria for assessing and guiding treatment. But, especially with experience, clear observation, empathic communication, the will to succeed can serve to replace or complement conceptual analysis and decision making.

I salute Rogoff and Mozgala, and expect they should share credit for the accomplishment. I would also expect readers to be motivated to broaden their perspective on dealing with limitations of physical mobility, regardless of practice discipline. Creativity, flexibility and openness to dealing with problems in an existential, rather than simply mechanical and prescriptive way, is legitimate and often fruitful.

### Tom Myers, Author of *Anatomy Trains* (2nd edition, Elsevier, 2010)

When this story appeared in the papers, I was very interested in the method employed, so I am glad to have this level of detail from both teacher and recipient. How wonderful that the method has no name! It reminds us that the path of healing is not restricted by specific approaches, but wends its way upward in switchbacks. It reminds us that

our 'name brands' in bodywork – dear to us if they are our own, or raising our interest or suspicion (or both) if they seem to run counter to our beliefs - are but signposts along this path, and not the path itself.

Secondly, I was impressed with the emphasis on what Gregg can do. So much of medical rehabilitation starts with what the patient cannot do, striving to make the currently impossible possible again. It was Emilie Conrad (of Continuum fame), herself a dancer originally, who first introduced me to the very liberating concept of: Start with what they can do. Explore that, and the novelty will arise, and then explore that, which leads on to more novel movements. Emphasis on the problem, difficulty, lack, and inability – even with a 'helpful' attitude – can leave a patient frustrated and depressed.

Tamar's method seems to owe much to the dancer's sure knowledge that everyone has limitations, and yet everyone has a world within his body. Gregg's Bully had limited his movement range, and then he himself had limited it further by adopting and constantly reverting to his CP stance, his rolling gait, his locked-in legs. By exploring an unrelated but possible movement within his range, he was led naturally up the switchbacks rather than going for the straight line uphill – which can be an effective path for the simple injury rehab, but not for a complex and enduring 'condition' such as Gregg presented. Seeing the situation as an opportunity instead of a problem is the artist's prerogative, and one that more therapists would do well to adopt.

Thirdly, we can note that everyone of these conditions has a somatoemotional component, very much evident in Gregg's self-disclosing comments – he loves this and he's about to gag; he's standing and crying out in his fear of failure (falling). Those who undertake these deep structural healing processes should be prepared for cognitive dissonance, for not believing everything you think, for contrary emotions that occupy brain and belly together, for deep swoops and giddy highs that follow each other. Gregg clearly had the strength for such a journey and not everyone is willing.

The shaking is an essential part of such releases, when the 'accelerator/brake' (combined excitatory and inhibitory signals, autonomic and somatic) lets go its grip and neuromuscular patterns (in my experience) let go, shake for some time, and then normalise. From the sounds of it, there was a 'whole lotta shakin' goin' on', indicative of both how deep Gregg's patterns ran, but also how deep he was prepared to go to free them.

Finally, we must note how much time and attention it took to stage *Diagnosis of a Faun* – and to complete even this stage of healing. There is no indication of how many hours the two spent together in the nine months, but on the basis of my own experience with similar journeys, I can easily believe that both were engaged pretty full-time on this project. How lucky for Gregg to have such a dedicated teacher! How lucky for Tamara to have such a willing student! Most professionals in the healing trade cannot set aside so much time for one person. But it is in these journeys that the possibilities of healing are revealed, which are later refined and fitted into protocols by others who follow. Thank you Tamara, and thank you Gregg for the glimpse into deep and path-breaking healing via the arts.

## Eyal Lederman

### Rehabilitation and re-abilitation

Movement rehabilitation and motor normalization following central nervous system or musculoskeletal injury occurs naturally in varying degrees for most individuals. Following injury most humans will take physical actions that will support their spontaneous and unaided recovery. This would happen without any special knowledge or understanding of the underlying physiological principles underpinning their recovery. This recovery behaviour is the basis of functional neuromuscular rehabilitation. In this form of rehabilitation the individual is attempting to, partially or fully, execute the movement that has been lost. As in Gregg's process, attempting to walk becomes the rehabilitation for the person who lost the ability to walk. The focus in this form of movement recovery is on the overall skill of performing the particular movement (skill rehabilitation). The therapist's role (or Tamar's in this situation) is to provide feedback/guidance about the "correctness" of the movement, e.g. the placement of the foot on the ground or overall posture in movement.

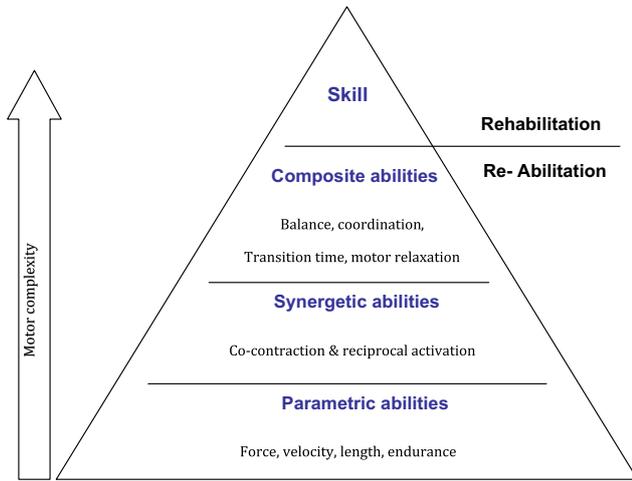
However, this approach does not always lead to the intended results. Individuals who have motor losses may develop movement patterns that circumvent their losses. As in Gregg's condition he presented with walking difficulties due to losses in the control of balance and coordination (as well as other factors). Using the skill rehabilitation principle, one would imagine that by encouraging the individual to increase their walking, "walking would train balance and coordination during walking". However, what may happen is that the individual will get better at using their compensatory pattern as were Gregg's pre-training walking patterns. He tended to have slower walking speed or use shorter steps, rather than truly improving his control of balance and coordination during walking.

Balance and coordination are part of several control building blocks that make up skilled movement. These building blocks are called sensory-motor abilities (Figure 3). A therapeutic approach that targets the various motor abilities is called "Re-Abilitation". At this level of rehabilitation the aim is to recover control losses associated with particular abilities. Hence, in Gregg's case Tamar focused on challenging balance and coordination in dynamic and upright postures during the training.

As we see in this case-study, skill rehabilitation and re-abilitation are both therapeutically important and are often used in combination. However there may be a shift of focus towards one of these particular approaches depending on the individual's condition and their phase of recovery. This is seen in Tamar's and Gregg's journey.

### The code for neuromuscular adaptation

Neuromuscular rehabilitation is a straightforward process – anyone can do it. Indeed, we all do it all the time. Every day we take actions that result in movement and behaviour changes; we can self-modify our motor control. Furthermore, the neuromuscular system has the capacity for self-recovery and to reorganize. It means that within our behaviour there are certain elements that facilitate the recovery of movement control.



**Figure 3** Rehabilitation of movement control can be at skill or ability level. Skill-level rehabilitation aim to recover movement losses by practicing the movement affected. Ability-level rehabilitation (re-abilitation) focuses on challenging underlying motor ability changes/losses. (from: Lederman E 2010 Neuromuscular rehabilitation in manual and physical therapy. Elsevier).

In functional rehabilitation we identify five such elements that optimize neuromuscular adaptation: cognition, being active, feedback, repetition and similarity (Figure 4). Hence in order to learn a new task, modify our behaviour or help our system recover we need to be aware of what we are doing (cognition) and we have to actively perform the action that we aim to recover (being active). In order to correct our movement we rely on internal information from our senses or depend on guidance by someone (feedback) and we have to practice the task many times (repetition). Furthermore, the practice has to closely resemble the movement we aim to recover (similarity).

These principles are evident throughout Tamar's description of her work with Gregg. She is intuitively facilitating Greggs movement control by introducing these adaptive code element into the training/dance programme. This approach will promote a functional recovery that is more likely to benefit the individual in their daily activities. The results are more likely to be maintained in the long term and

could help to reduce the overall duration of the treatment/training programme.

**Further reading:**

Lederman, E., 2010. Neuromuscular Rehabilitation in Manual and Physical Therapy. Elsevier, Edinburgh.

**Internet resources:**

- [http://www.cpdo.net/shop/lederman\\_neuromuscular\\_rehabilitation\\_ch01.pdf](http://www.cpdo.net/shop/lederman_neuromuscular_rehabilitation_ch01.pdf)
- [http://www.cpdo.net/shop/lederman\\_neuromuscular\\_rehabilitation\\_ch14.pdf](http://www.cpdo.net/shop/lederman_neuromuscular_rehabilitation_ch14.pdf)

**John Hannon**

**The artists**

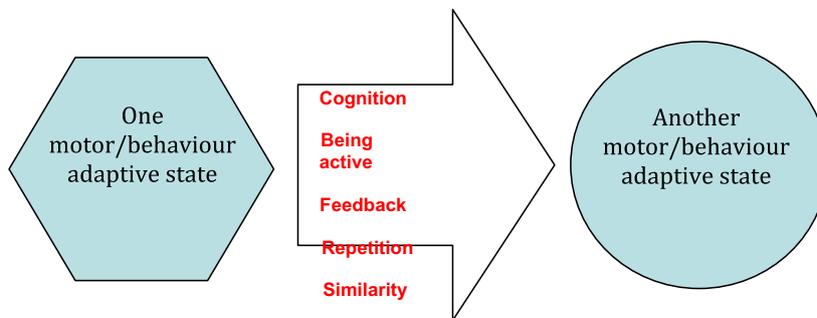
She: a choreographer who found the young actor interesting and knew he could dance beyond cerebral palsy with his body energy that was active, strong and responsive (and, she felt, in direct contradiction to his hampered movements).

He: the actor both articulate and willing to learn (and to endure the intensity of learning and not knowing). He describes his constant fear of falling (strong enough at times to provoke tears and severe nausea). He finds himself in the grip of the "bully reflex" that perpetuates his damaged movement patterns.

Together, they find a way to transform these movements into capable and expressive ones; this process is emotional and arduous in large part because, as he puts it, he involuntary tenses when placed in better alignment because **he believes** the Bully reflex believes he must fall.

Putting aside the enormous willingness of both parties to be vulnerable and honest. Putting aside the vast resources of creativity and intelligence both applied to these day-to-day challenges. What draws admiration is the pleasure they take in persistence.

Tamar Rogoff in her persistence in a lifetime of body learning (and the courage to move past her teachers and find her own way). Gregg Mozgala in his moment-by-moment anguish as he painfully transcends his fear of falling to access his untapped capacity for balancing upon strong bones, intact nerves and a sharp intelligence. Together, they persisted and moved past the illusions, the delusions and the coarse muscle habits.



**Figure 4** Experiences that contain the five code elements are more like to promote adaptive changes within the neuromuscular system resulting in movement and behavioural changes. (from: Lederman E 2010 Neuromuscular rehabilitation in manual and physical therapy. Elsevier).

What are some of the things we can learn and be inspired by their actions? For one, there are our own illusions and delusions; another is to not let our training hamper our work.

### Current illusions

**William James (1890)** questioned the then-current perception of the human body as “the same old body always there.” Since then, more nuanced views of the body have arisen but the reliability and validity of palpatory findings continues to be a worrisome reminder that much remains to be learned. There are interesting pilot studies of the vagaries of touch perception and the potential for illusion. Even though this seems but a dry wasteland when compared to the marvellous (and fluid) duet of learning/moving as presented in *Diagnosis of a Faun*, here are some intriguing items.

**Rock and Victor (1964)** presented people with objects whose visual shape was vastly distorted experimentally from their tactile shape. They found that, after simultaneously grasping and viewing these objects, the subjects were strongly biased in favour of the visual sense and unaware of any conflict between the senses.<sup>1</sup> This idea that visual assessments take precedence over tactile findings suggests that therapist training must include methods of recognizing (and extinguishing) visual bias. This is particularly relevant when bridging the gap between anatomical book-knowledge<sup>2</sup> and that of the moving, breathing and utterly responsive clients we care for.

In other studies,<sup>3</sup> the subjects often ‘know’ their body is different than their illusory perceptions; they are not in *delusion*<sup>4</sup> but they find the *illusion* inescapable. **Longo et al. (2010)** quote **Lhermitte (1942)** as noting the

importance of “distinguishing between how we *perceive* our body to be, and how we *remember* or *believe* that it is.”<sup>5</sup> They note this challenge is all the more poignant when we realize there is no equivalent to a GPS satellite signal in the body that telling us where our body parts are in space.

### Parallel touch systems

**Myers (1998)** points out that the English words ‘blind’ and ‘invisible’ define the incapacity of seeing and of being seen; and, although ‘numb’ describes the inability to feel, there is no word for not being able to be felt. This inadequacy of our common language for mapping what **Lea (2009)** calls “the messy corporeal geographies of learning a skill” make it all the more important study how people learn to move well. This marvellous exploration of the possible as seen in *Diagnosis of a Faun* is in sharp contrast to what **Lewit (2010)** describes as the plight of modern medicine deftly using complicated equipment while neglecting communication and the evidence of our eyes and our hands.

**Longo et al. (2010)** note evidence of two parallel touch systems. In addition to the myelinated afferents serving the skin, they note the unmyelinated tactile C-fibres form a parallel system also serving the skin. This they describe as a system for ‘affective touch.’ **Serino and Haggard (2010)** also discuss the dual nature of touch. They note that touch is a crucial agent in the construction of our self-consciousness<sup>6</sup> and that tactile perception may vary depending on the mental representation of the involved body part.

**McGlone et al. (2007)** continue to study the C-tactile afferents which they hypothesize drive the “emotional somatic system”. They regret that although most acknowledge somatic sensation drives the subjective experience of pain, it is not often appreciated it also provides the emotional pleasure of touch.

**Tremblay and Elliott (2003)** also discuss dual sensory processing. They describe two distinct visual streams; the ventral stream functioning for form perception and object recognition and the dorsal stream associated with action-based perceptual judgments. To explore this further, they studied visual–vestibular illusions; interestingly, they explain the kinesthetic system as also being stimulated by motor involvement and frame of reference orientation.

Another dual sensory system proposed by **Mittelstaedt (1996)** discusses postural perception as being affected by previously unknown graviceptors located in the trunk. The first input enters the spinal cord at the 11th thoracic level. He hypothesizes the second follows either the phrenic or vagus nerves yielding gravity information through sensing changes in inertia of the blood contained within the great vessels. **Vaitl et al. (2002)** corroborated these findings with additional evidence that afferent inputs from the cardiovascular system are significant in postural perception.

**Decety and Grèzes (2006)** note yet another relevant dual system: that of a person perceiving the actions of another. They cite studies that suggest when individuals perceive the actions and the emotions produced by others, they use the same neural mechanisms as when they produce the

<sup>1</sup> **Carter et al. (2009)** extended this exploration of visual versus tactile dominance; their findings suggest the presence of tactile ambiguity. By using a grid of discrete stimulators, they found a tactile equivalent of the visual apparent motion illusion where the subject was unable to decode a solitary stimulation pattern. This implies the possibility for palpatory touch, at times, to lead treatment astray.

<sup>2</sup> **Huijing (2009)** regrets the lack of detail in current texts in the descriptions of the “rapport” between adjacent muscles found in many French anatomy texts of the 19th century. This disappearance of detail pales when compared to the lack of consideration in kinesiology texts of the nuanced movements championed by dancers, mimes, gymnasts, circus acrobats, martial artists, musicians and athletes in general.

<sup>3</sup> For instance, **Longo et al. (2010)**, describe the Pinocchio illusion where the experimenter vibrates the subject’s arm that is holding the subject’s nose. (Vibration of the muscle tendons triggers the brain to consider the muscles as lengthening.) Thus a perceptual dilemma; the hand is perceived to be moving yet it is in continuous contact with the nose. Many subjects experience their noses as growing longer from this illusion while remaining perfectly aware their noses are not changing.

<sup>4</sup> As compared to patients with certain brain lesions; there are people that experience ‘numbsense’ (similar to blindsight) where they can localize touches that they are unable to detect.

<sup>5</sup> **Sacks (1995)** states that it is not enough to apprehend something. The mind must be able to accommodate and retain a discovery and its possible connections. It is this second process that would benefit from careful study of the Rogoff:Mozgala process.

<sup>6</sup> This resonates with **Seitz (2000)** who believes there is a bodily system of thought: “we do not simply inhabit our bodies; we literally use them to think with.”

actions and emotions themselves. Moreover, a number of neuroimaging studies have shown that similar brain areas are activated while *imagining* one's own actions or those of another.

It may be possible to yoke in our minds these multiple sensory systems and cobble together some speculations about the magic and mystery of Rogoff:Mozgala. For instance, it is striking how emotional concerns are portrayed in the excerpts from both Mozgala and Rogoff. If we acknowledge the existence of multiple perceptual pathways, perhaps we will find additional ways of using them in ourselves as we help those we serve.

#### Further considerations

Cordo and Gurfinkel (2004) examined the sit-up. They used this action to illustrate that complex movements have associated movements not consciously controlled but essential for successful function. They state that since complex movements typically require a great deal of mobility (which makes instability likely), anticipatory postural adjustments (APA) are used to regulate posture. This implies for us to understand the capacity for humans to move, particularly those with impairments, we must track both APAs and associated movements as well as make judgments regarding their quality and appropriateness. In fact, we may have to map apprehensive APAs as well.

Horstmann and Dietz (1990) suggested that in upright posture, a gravity-dependent mechanoreceptor system was needed (in addition to visual, vestibular and muscle proprioceptive systems) to signal the position of the body's centre of gravity relative to the feet. They further suggested that these force-dependent receptors are pressure receptors within the joints and the vertebral column.

Pozzo et al. (1998), while studying subjects both weightless and in normal gravity, found that gravity either initiates or brakes arm movements indicating that gravity may be represented in the planning of motor commands. Carson et al. (2009) devised a robotic system to reverse the effect of gravity upon the arms of participants.<sup>7</sup> They found that in normal gravity, movements made on the downbeat were more stable than those on the upbeat; they also found this relationship was reversed when gravity was neutralized. They concluded that the ubiquitous tendency for downward movement on a musical beat arises "not from the perception of gravity but as a result of the economy of action that derives from its exploitation."<sup>8</sup>

<sup>7</sup> Carson et al. had noted (while we find our arms being moved by music) that "invariably we will coordinate our movements so that the end of the downward phase of our gesture coincides with the beat of the movement."

<sup>8</sup> This echoes Massion (1994) who noted that after training the postural control system, the goal is to be as economical as possible in terms of energy consumption. This is accomplished by using passive forces (such as gravity) when possible. He noted that the "overall picture of postural organization that emerges from recent investigations is a long way off the picture of classical postural reflexes presented by the Sherrington School. While the old description of these reflexes is still valid and their analysis is still a useful means of experimentation and neurological evaluation, the emphasis is now on the flexibility of postural control and its adaptability to different contexts."

Taken together, these suggest we should look at how Rogoff arranged Mozgala; how she used stamping and shaking. Perhaps part of their success is based upon her seeing not only his movement but seeing where he could better "root" (with the help of gravity) his stance and his actions. Metaphorically, if we imagine a joint or muscle as a "tree" and the whole body's action as a "forest" perhaps we can simultaneously see not only the forest and the trees but also the roots. And, lastly, perhaps we can formulate answers to the question of how quickly is it possible for improvement to happen? And how to make gravity trustworthy and taking the terror out of the distance between ourselves and the ground?

Consider a well-designed study of the quality of postural balance: Tsang et al. (2004)<sup>9</sup> found elders practicing Tai Chi improved stance control under reduced or conflicting sensory conditions with better balance than non-Tai Chi elders similar in age and gender. They also found the elder Tai Chi practitioners behaved similar to the young healthy subjects in terms of controlling body sway in their experimental design.

Questions abound. How fast can a person learn movement excellence? Does it take more than a year to achieve balance? Just what is the quality of movement of healthy students? Let us use the experience of Rogoff & Mozgala; let us choose to believe there is much more possible in the fields of movement quality and motor control than current studies suggest.

What then can we learn from bodyworkers and movement therapists? From the wealth of published wisdom there is only room to consider a few wise examples:

Maitland (2002) describes treatments as being of three kinds: relaxation; obtaining correction or, thirdly, integrating the subject as a whole. Browne (2006) notes three characteristics of what he calls qualitative exercise.

1. Self-awareness ("know what you're doing to do what you want.").
2. Make the exercise look like the behavior you want.
3. Link the exercise to real-life movements.

Rywerant (2003) recommended a continuous, creative series of evaluative responses to what the teacher saw and felt in his or her pupil. He states: "The outcome of the process may be considered to be *an answer to a question or problem concerning the subject*. In some instances, a question may be proposed uniquely for the purpose of having it answered, as in the case, consciously or unconsciously, with most creations of art".

Blackburn and Price (2007) suggest being present with the client. Instead of "spacing out" where both therapist and client drift in their own separate worlds, they present ways for the therapist to stay present as well as ways for the therapist to encourage the quality of presence in the client. In this they agree with Rywerant (2003) who notes that when the pupil is excessively alert to a possible infringement on its security, start by lessening this concern.

<sup>9</sup> Tsang et al. used computerized dynamic posturography to study (in groups of about twenty) (1) young healthy students naïve to Tai Chi, (2) elderly Tai Chi practitioners (training at least 3 times weekly for at least a year) and (3) healthy elders without Tai Chi experience.

### Speculative conclusions

The very existence of the splendid collaboration of Mozgala & Rogoff inspires us to move beyond scientific experiments. Their success suggests the need to revamp our own self-training in observation, palpation and motivation. We can re-learn how to listen, how to touch, how to feel and how to move. We need to be aware of the possible illusions that face us when we reach out and touch someone.

Perhaps we also need to find an inner well of somatic empathy to internalize a more accurate representation of what our clients/pupils/patients are feeling and how they are moving. This means a three-dimensional living anatomy constructed of volumes rather than a lifeless sheaf of plane images. Also note these volumes must move to be representative. This movement includes the sloshing of liquids such as synovial fluid, lymph, blood and inflammation. Somehow we must sense the spring of bone and cartilage. Somehow we must tell the difference between resting muscle's heft and drape versus the stiffness and solidity of a tightened/shortened/contracted muscle. We need to sense layers; we need to identify those places that do not compress or elongate or glide well.

We need to learn to think for ourselves. Margaret Mead<sup>10</sup> is reputed to have said "that the ways to get insight are to study infants; to study animals; to study primitive people; to be psychoanalysed; to have a religious experience and to get over it; to have a psychotic episode and get over it. ...". Let us get exposed to the many wonderful ways of seeing and treating people. Let us reach basic competencies in a formal method of bodywork or movement therapy and then 'get over it'. Learn another way and get over that one as well. Once we have confidence in our own competence, perhaps then we may think for ourselves.

We need to debate our methods and our rationales. We need to translate the research in related fields to our own purposes and then we need to debate our rationales. We need to welcome temperate yet incisive criticism from our colleagues and develop a common language in what could be termed "spatial medicine".

For instance, we benefit from learning of altered movement patterns appearing before the onset of pain as observed by Szeto et al. (2005).<sup>11</sup> We further learn after observing if we find similar findings in our own practices. We vastly learn more when we share our findings.

Towards this end, we would do well to learn from those who seek movement excellence, whether teachers or artists. We need to learn from the best. There is a place for dual sensory streams and tactile illusions but let us not allow the dusty academics to spoil the view of the possible. Let us harness the body's capacity to exploit multiple sensory channels in ways utterly novel to scientists and clinicians alike. With eyes freshened by seeing the Rogoff:Mozgala transformation, let us develop confidence in methods of our own.

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<sup>10</sup> Margaret Mead quote (viewed 1.26.10) at <http://www.goodreads.com/quotes/show/170824>.

<sup>11</sup> Szeto et al. (in a pilot study of 23 office workers) found that altered muscle recruitment patterns were observed in symptomatic subjects before the task became uncomfortable.

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