Motor Coaching for Teaching Swimming and Other Motor Skills in Individuals with Sensorimotor Impairment

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Sensorimotor Impairment in Neurological and Developmental Disorders is Due to Differences in Synaptic Brain Connections and Causally Explains Differences in Social Interactions and Communication

- Main consequence is a separation between mental intent of an action and physical realization of the intent

➢ A "brain-body disconnect" leading to difficulty performing purposeful motor action and reduced body awareness

- Performance ≠ Intelligence & Communication ≠ Language

➢ We have to go against the instinct to believe what we see and inferring internal states of mind from observed symptoms or behaviors

Historically, the perspective in autism was that problematic behaviors were intentional and proof of disinterest in participation or learning, and evidence of low intelligence or lack of understanding, however, the last ten years of research demonstrate that the root cause is sensorimotor impairment.

The typically developing motor system develops internal maps of the body and external environment such that it has a good sense body feeling and of where the limbs are at all times, as well as able to predict the consequences of the body's actions. In those with atypical developed nervous systems, those maps are missing or abnormal.

Brain functions, such as gross and fine motor output, auditory processing, visual processing – those are brain functions and are NOT correlated to intelligence. Problems in brain functions, however, are highly correlated with the ability to express that intelligence.

All communication is a function of motor output (i.e. the sensorimotor cortex). The language centers are separate from the areas of the brain that carry out the motor function of communication. The safest assumption is that they can and do understand at age level. Nonspeaking does not equal non thinking.

Many in the nonspeaking population report the feeling of being in a body that is uncooperative and uncontrollable most of the time, often not matching what is going on internally. Quotes from some self advocates: "My body is the enemy", "My body is uncontrollable".

This perspective shift of separating the person from their body and understanding that the body can outwardly present as unreliable in representing what's going on on the inside takes time, but is necessary to be able to provide effective sensorimotor support.

How Do We Know If Sensorimotor Impairment Is Present?

- Almost 90% of those with autism have variable degree of motor impairment* (most do not even have the diagnosis of motor impairment)
- Almost 100% of those with Down Syndrome have variable degree of motor impairment**
- Also common in other conditions (Rhett Syndrome, Angelman Syndrome)
- Fine motor impairment, including lack of speech OR non-functional aka unreliable (scripting or echolalia or only responding with 1-2 words) speech is indicator of worse motor impairment vs. when functional speech is present
- Assume all those with nonspeaking or unreliable speaking neurological or developmental disorders have significant problems with body awareness and motor function

* Bhat, 2021; ** Wilson et al, 2019

Many researchers are pushing for "motor impairment" to be added as a core descriptor of autism

Potential Movement Differences (1)

- Difficulty with finding or feeling their limbs
- Imbalance between inhibition and activation forces - over and undershooting when aiming
- Difficulty in starting, stopping, combining, continuing & switching movements i.e. the whole motor plan
- Strategic purposeful actions (that may look 'odd' to the outsider) to facilitate movement, regulation, or comfort i.e. Jumping, flapping, lying on the floor, climbing to a height
- Frequent automatic and impulsive actions:
  - impulsiveness - Involuntary performance of unwanted, opposite from intended, painful or aggressive actions (like tics)
  - "motor loops" – over practiced, automatic, actions difficult to self stop or be interrupted i.e. throwing things into water
  - ➢ Often these actions are or were attempt to provide sensory input or pleasure or sense of calm but may turn into maladaptive actions that become the dominant strategy and or 'get stuck' in
  - ➢ Assume they are NOT intentionally trying to harm or act inappropriately

Being aware of the movement differences comes a greater ability to analyze a situation and problem solve various ways of accommodating. Differences in the way people are able to use their bodies and focus their attention leads many to assume that a person does not care to participate or communicate and does not desire relationship. These assumptions affect our expectations , the way we speak with them and the educational and social opportunities we offer them. Our assumptions color the support we give to people.

Practice doesn't make perfect, practice makes permanent. The body doesn't care if a maladaptive / problematic action is being overly practiced and becoming easier.

Potential Movement Differences (2)

- Difficulty generalizing skills to new environment (including social context)
- Difficulty with crossing midline, alternating limbs, coordinating upper and lower body together
- Difficulty with movement ON DEMAND
  - difficult or impossible if action has to be concentrated on, easier if peripheral and primarily automatic
  - this includes purposeful breathing
- Fine motor function more challenged than gross motor
  - "my hands always feel like I'm wearing oven mitts"
- Difficulty with depth perception and coordinating eyes with body
- Difficulty with maintaining a rhythm

Their environment includes a social context; adding or subtracting or changing a person while performing a motor skill can make it feel novel again; being able to perform a motor skill in different environments and contexts is something that needs to be practiced, but can definitely be achieved.

Tips for Interactions With Students Without Communication

- It may take the first few sessions for a student to adjust to your presence and space
- Don't repeat instructions or presume they don't understand / didn't hear
- Make it conversational, interesting, and fun, even if one sided
- Talk TO the person and age appropriately
- The word "NO" may be triggering – instead use "try again" or "not quite"
- Reduce environmental sensory pressure / distractions if possible
- Don't narrate what you believe they are feeling / thinking based on what body is doing

➢Presume Competence
(your beliefs about them WILL impact your interactions)

It can take time and effort for a sensory system to build tolerance to people and places

Once you've given an instruction and then you notice they don't carry out the task, that's where effective support comes in

Real inclusion is talking to the person who can't speak from knowing that they would still want to you to talk to them even when they can't respond. Say what you are thinking out loud, tell them about yourself, any interesting facts you learned.

Talking TO the person vs. about the person in front of them: if needing information from their parent, acknowledge that you are going to ask their parent something about them. Avoid talking to a nonspeaker at a lower age level even when they present as having a "beginner" or "juvenile" motor system.

It's easy to make incorrect assumptions of what's going on on the inside when working with someone who has an "unreliable" body and you don't have their communication to confirm their internal feeling. It's better not to take guesses.

Coaching Approach – Observe and Support Through a "Sensory-Motor Lens" vs. a "Behavioral Lens"

- Presume competence and capacity to learn but not already-learned motor plans even for simple skills
- View inability to perform a skill and challenging behaviors as "can't vs. "won't"
- Listening and engagement do NOT have a certain "look" → ~~"all behavior is communication"~~
- Have a large repertoire of strategies to pull from – may stop working or not work one day, will the next
- Separate the person from the body (use different language) i.e. "the body is bailing" vs. "he's a 'runner'"
- Support is a ladder, not something you always reduce; try to match what is needed in the moment
- Motor learning is very possible, but will take longer and is not usually linear
- Don't give up on them or yourself when things get challenging
- Have a "no mistake" mindset – just try again a different way or find a different reachable goal

If it's something that they haven't practiced in that particular context, it may still be impossible despite being a relatively simple skill

The view that one needs to be looking at you and still to be learning and listening does not apply to this population. NOT all behavior is communication because we know that some actions are automatic or impulsive.

The language that we use is important because it dictates how we view and interact with others.

Neuroplasticity (motor learning and improvement) is always possible. It will take longer, but trust the process and have patience.

High expectations plus high effective support will yield amazing results

The skills of 1) motor coaching and 2) problem solving through other challenges such as continuous movement, anxiety, OCD type behaviors, repetitive movements and impulses, take time to practice and develop. Be okay with trial and error. And if you need to take a minute in the middle of a lesson to think about a different strategy – that's perfectly okay to tell the parent and child that you are doing so. Or reach out to another instructor (or myself) to get new ideas or work through the problem to come back the next lesson with more tools to try.

Dysregulation Can Look Like Many Things Other than Crying, Screaming, Aggression, and the Body Bolting

- "noodle body"
- Uncontrollable laughter
- Increased impulsiveness or automatic behaviors (i.e. nail picking, spitting)
- Getting 'stuck' in a position or on a surface and unable to move
- Increased vocalizations or unreliable speech
- What may appear to be "defiance"

It may not be possible to determine the source of dysregulation if communication is not present, however if the dysregulation is abrupt and drastic, assess for potential source of pain or other physical or emotional need

When Working With Those Who Have A Disconnect Between The Brain's Thoughts and the Body's Actions,

MOTOR COACHING
Is the Main Strategy for Creating a Shortcut
For the Person to Get to the Desired Action

**Caregivers and parents need support, encouragement, teaching, and practice – you are instructor to both **

Motor Coaching

- Talk TO the body – we are not helping with WHAT to do but HOW to do it (not just for swimming skills but for any movement they may struggle with in the moment)
  - Use prompts and cues (see next slide)
- Break down the steps of the motor plan (sometimes into very small increments) – work on one thing at a time, then link to next one
- First word when coaching should always be a body part or an action –
  NOT the students name or the end goal i.e. “hands pull”, “arms lift”, “elbows open / straighten”
- Avoid “Can you put your head back?”; be confident and say “head back”
- Use specific language but vary your prompts – don’t say the same thing over
- Use fewer words and instructions, don’t speak too loud or fast
- Give them time (more than you think), don’t always jump in right away to help
- Be patient: as long as not fixated on the goal but the steps, you’ll get there together

Vary your prompts - you never know what magic word might unlock movement or inhibition. For example, your first verbal prompt may be “Turn your head”, but if that doesn’t work, you can try “bring your nose to the left”, or “Turn your chin” – you are asking for the same action, but in a different way.

Needing fewer words and instructions is the result not of difficulty with understanding or lower intelligence, but of an abnormal sensory system with having to process excess noise from the outside world plus abnormal information coming into the five senses

It can take time for the person to “organize their body” to bring awareness to the relevant muscles and then think about how they need to execute the movement.

Kinds of Prompts in Motor Coaching

- Verbal
  - motor step instructions i.e. "knees up into chest"
  - initiation i.e. "and…GO"
  - continuation i.e. "keep going"
  - preventative (from observed experiences) i.e. "your body is going to want to throw x in the water when you see it, but you are going to keep your body walking straight past it"
- Physical
  - light tap or firm touch on muscle(s) needing to engage
  - take some or all of the weight of the limb passively through the motor plan of the movement (= "hand over hand support")
  - stabilizing
  - positioning / repositioning
- Visual
  - demonstration
  - brightly colored targets or hand/feet placement markers, painters tape to make a pathway
  - silent support with written instructions of a reminder or 2-3 simple steps
  - gestural / directional

Be aware of where you are standing when you physically support them (avoid being right in front of them if possible)

If someone is constantly moving and fast, you can use own voice to suggest modulation of the action by slowing down your speech and your own movements so that they meet you somewhere in between (this is called entrainment) and vice versa for someone whose pace or arousal level is too slow for the task at hand – you can add pep and volume in your voice to help them speed up.

Motor Coaching Tips

- *Always do skill yourself to understand the movement through their body*
- Don't forget to coach the eyes
- Don't forget that holding the body still is often a step in a motor plan
- When progressing something, don't change more than one thing at a time i.e. level of support, motor skill difficulty, or cognitive demand, social or physical environment
- Acknowledge ALL success (esp when you see / feel muscle initiation despite no follow through)
- Few min of free time at beginning to get used to the environment and get oriented is helpful
- Warm up with eye / body coordination skills like throwing / catching & cross clapping is helpful
- Regulation required before controlled movement
- Adapt equipment as needed i.e. flutter boards with side cutout handles, use a balloon vs. a ball

Exercise for the instructor: choose a simple daily task, like picking up an object or getting down to the ground, and break down every tiny movement involved. Focus on each individual action that your body needs to make including directing your gaze, shifting your hand, and adjusting you grip by consciously thinking through every step, you can experience the mental effort and coordination challenges that someone with motor planning issues might face.

Adapt equipment as needed i.e. flutter boards with side cutout handles when grip strength is poor
https://www.amazon.ca/dp/B0B64H1BNB?ref=ppx_yo2ov_dt_b_fed_asin_title
, use a balloon throwing / catching if not ready for a ball

Make sure you delineate and explain the time length and expectations of the task – may seem obvious to us but this is EXTREMELY stressful for someone who is trying so hard to control their body.

Progression Towards Mastery of a Movement

1. Getting into the position
2. Holding the position
3. The movement or skill at a basic level (working towards mastery over time)
4. Repetition of the skill or an increase in distance
5. Ability to perform the skill in different directions

Adding Cognitive Demand:

6. Sequences (combing skills in particular order)
7. Movement in relation to other bodies (synchro, partnering, games)
8. Controlled variation in speed (typically the most difficult / last thing to progress)

Lesson Preparations

- Have a lesson plan plus 'back up' plan(s); be prepared to adjust goal on the fly
- *Plan and take breaks* especially if student has no reliable communication – you can set a timer every 5-10 min then take a 1-2 min break (and their rest may not look like stillness)
  - when sensorimotor impairment is present, purposeful movement practice requires far more mental and physical effort - they will tire more easily
- Create an intensity 'arc' for the session if 30 min+ – returning to an easier skill(s) at the end helps to finish in a regulated state; always end before dysregulation

Trust that they ARE working very physically and mentally hard (having an abnormal sensory-motor system requires this for purposeful movement) and that they will need more breaks than you think. Not proving enough rest will lead to dysregulation and anxiety.

A break for them may not look like stillness – their rest time may look like moving around if that is their body's 'default' movement pattern.

If Motor Skill Practice Is Especially Challenging That Day…

- Remember that ANY purposeful movement practice is beneficial
- Practice positions and movements used in supporting the body during swimming in water OR on deck:
  - star fish or glide positions in standing
  - Forward and backward arm rotations
  - laying on back in tuck position then push out for a glide
  - laying on back or front for alternate kicking (you may have to do a LOT of 'hand over hand' to teach kicking and alternating arm rotations)
  - pulling the ring buoy in to work on hand control and grip strength
  - jumping
  - coordination practice – throwing objects into or at target, throwing / catching
- Don't neglect teaching water safety education at age level even if cannot respond back

You can still have a successful lesson if they are having a having a challenging day with their body.

You don't need to get them to show you proof of ability and desire to learn – teach without the expectation of testing their knowledge.

Example: Jumping Down From a Height

(When teaching jumping, begin with jumping down as it is easier than jumping on level ground)

- Demonstrate
- Colored feet placement markers or colored mat placement to stand on
- Can set a visual target floating on water to show where the surface is
- 'Buddy up' to the person and hold their close forearm with both hands
- Cue bending knees and hips slightly (go down with them)
- Cue pushing off of toes
- Prompt two feet landing
- If having trouble jumping into water, begin on deck first from low step
- If doing too big of a knee bend, practice sitting to high chair / stool
- If not pushing off feet, practice calf raises or digress to standing on edge of a step
- If light enough, can lift them through the motion of a jump (i.e. "hand over hand" support)

Teaching a Front or Back Float in Water

- Demonstrate
- Practice getting into the star position in standing first
- Can use foot placement markers on deck or take your foot / feet and step on theirs to hold in place (if support takes two people ask caregiver for help)
- Can use your own hands as a target to touch when outstretching hands
- Work on arms and legs separately first, then together
- Try not to lift their limbs *for* them – you are trying to help with autonomous muscular initiation with effective motor output cueing and body awareness support
- Can use a mat in the water so they are only working on body position rather than the float mechanics at same time
- *Success with only verbal prompting of the skill name Will. Take. Time

What It's Like In Their Own Words

(see handout)

- I encourage anyone working with the nonspeaking population to meet with a communicative nonspeaking or unreliable speaking self advocate or read their blogs and books if their own students do not have functional communication

- The following are questions I asked of two of our older local self advocates who use text based communication: Peyton Thorpe and Marcus Oulette

1. Can you describe what physical challenges you face with your body?
2. Can you describe the issues you face with eye control and visual processing?
3. What helps you most when learning a new motor skill?
4. What is least helpful to you when learning a new motor skill?
5. What do you want your teachers to know when they are working with you?

Learning what it is like from self advocates who can communicate is invaluable and the next best thing to getting feedback directly from your own student.

Can you describe what physical challenges you face with your body?

PT- MY BODY OFTEN FEELS LIKE IT HAS A MIND OF IS OWN. ITS A CONSTANT BATTLE TO GET MY LIMBS TO COOPERATE. I HAVE TO FIND WHERE I AM IN SPACE, FIGHT MOTOR LOOPS AND REPETITIVE STIMS AND TRY TO MAKE MY MOTIONS SMOOTH. ITS LIKE IM RUNNING A RACE BUT MY BRAIN IS WATCHING FROM THE STANDS, AND MY BODY IS SPINNING IN CIRCLES AND RUNNING BACKWARDS. MY BRAIN UNDERSTANDS BUT ITS LIKE MY BODY IS DAYDREAMING.

MO - MY DAY DREAMING BODY IS THE PERFECT ANALOGY. MY BODY IS LIKE A PUPPY THAT JUST WATCHED A RABBIT RUN BY, IT KNOWS WHAT IT SHOULD DO BUT THE PULL OF OTHER THINGS MAKES IT ALMOST IMPOSSIBLE. IMAGINE WANTING TO PICK UP A GLASS OF WATER BUT WHEN YOU GO TO REACH FOR IT, YOUR HAND ISN'T THERE. SO YOU FIND YOUR HAND, FLAPPING BY YOUR HEAD AND YOU CANT GET IT TO MOVE. JUST AS YOUR FRUSTRATION KICKS IN YOUR HAND STARTS TO MOVE AND YOU KNOCK THE CUP OVER.

PT: STRUGGLE, FRUSTRATION, JERKY MOVEMENTS, REPEATED. THE DESPISED MANTRA OF MY EXISTENCE.