Movement Integration

Biomechanics & Arthrokinematics (What is your intention?) Dr. Helen Mason
Integration of movement of many joints and in multiple planes of motion.

Motor Control - Definition: The ability to regulate or direct the mechanisms essential to movement.
Movement emerges from 3 factors: The individual, The task and The environment (What motivates your client?)

The Task
This can influence the organization of movement: Moving on a stable surface vs. moving on a moving surface.
Gross motor vs. fine motor activities
Open vs. closed movement tasks
Closed movement tasks are characterized by fixed, habitual patterns of movement with minimal variation that are performed in relatively fixed environments. Open movement tasks are movements that are unpredictable.

The Environment
This can enhance or impair movement: Good lighting and smooth surface might facilitate movement, where an uneven surface of poor visibility can interfere w/ movement organization.
Noise, available space, other distractions, etc.

The Individual
Constrained by multiple processes, including perception, cognition and action
Perception (Spirit) - Willingness
The integration of sensory impressions into psychologically meaningful information
Cognition (Mind) - understanding verbal cues.
Cognitive processes broadly include attention, motivation, and emotional aspects of motor control that underlie the establishment of intent or goals
Action (Body)
The control of actions implies understanding motor output from the nervous system to the body's effector systems, or muscles. The body is characterized by a high number of joints and muscles, all which must be controlled during successful movement execution

Acquisition of advanced Movement skills
Unconsciously and Consciously incompetent
Consciously and Unconsciously competent

Systems Theory
Multiple systems affect the outcome of successful or faulty movement acquisition and execution.
Systems theory allows us to take into consideration many factors;
Central Nervous System, Peripheral Nervous System, Stucture (skeletal, ligamentous, fascial, muscular systems)
Gravity, Load, Perception, Desired outcome, Experiences, Motivation, Habits

Motor Learning
The study of acquisition and or modification of movement. This study is the most applicable to a teacher.
How do we facilitate the acquisition of new movement or even more importantly facilitate modification of faulty movement? The process of motor learning can be described as the search for a task solution that emerges from an interaction of the individual with the task and the environment.
Motor learning effects performance, however performance is a complex matter interacting with many variables including fatigue, anxiety and motivation, hence change in performance can not only reflect learning but changes in other variables as well.

Common Forms of Learning:
Declarative Learning
This depends on awareness, attention and reflection. Pilates is built on the ability to heighten awareness of self through movement
Procedural Learning
Once a heightened state of awareness has been achieved, practice leads to procedural learning, which does not require awareness, but repetition. Giving clients a functional task to perform repeatedly will significantly improve potential for movement acquisition
Bio-Energetics
Energetic Medicine
Balanced movement throughout the entire system supports a balanced flow of energy throughout all the energetic systems. In energetic medicine where the body, mind and spirit are one, movement of the structure is movement of the entire system.

Practical Application of Movement Principle

Movement of Pelvis in all Planes
The pelvis can function as a "handle" to the spine, moving the spine into flexion, extension, rotation and lateral flexion or translation. Accurate Motion of the pelvis through space is essential for efficient functional movement.

Integration pelvis on trunk
Integration of the ribs with the pelvis in all planes of movement can facilitate axial elongation. Integration of the ribs with the pelvis can facilitate spine flexion, lateral flexion and rotation.

Integration of head & extremities on trunk
Integration of the head on the trunk can increase stability of the neck through large amplitudes of movement. Integration of the trunk with the extremity allows for the greatest production of force in the extremity. Especially important with throwing sports, racquet sports and golf. The power of combining core stability, spine articulation and integration of the upper and lower extremity provide the optimum environment for performance mastery.

Practical Applications
In the Pilates environment, we have the unique opportunity to control many factors which affect motor learning movement organization and movement integration. As a Pilates instructor, it is important to be aware of how these factors affect performance and understand that they may be adjusted to facilitate or challenge the movement.

Assistance
In the Pilates environment, we have the unique ability to adjust the level of spring tension anywhere on the spectrum from assistance to resistance. The challenge to the movement may be decreased by either increasing the assistance or decreasing the resistance.

Spectrum of Movement
Passive, Assistive, Gravity Eliminated, Movement Against Gravity, Resistive

Base of Support - The area bounded by body parts in contact w/ resistive surface.
Center of Gravity - Location of the center of the body's mass. As the base of support is increased or the center of gravity lowered, so decreases the challenge of the movement.

Balance and Proprioception
Balance: The ability to maintain bodily equilibrium. Balance challenges my be decreased as the base of support is increased and/or the center of gravity is made lower.

Proprioception: The unconscious perception of movement and spatial orientation arising from stimuli w/in the body itself. Proprioception challenges may be decreased with increased contact w/ a stable surface.

Coordination
Harmonious functioning of muscles or groups of muscles in the execution of movement. Coordination challenges may be added w/ multiple planes of movement and/or multiple moving parts.

Range of Motion
The degree of movement in which the joint or joints can be moved through space. In general, the smaller the ROM, the closer we stay to our center of gravity, the lesser the challenge to stability.

Lever Length
The distance from the fulcrum of movement to the distal end of the lever. In Pilates exercise, the lever can be either the upper or lower extremity or spine. The shorter the lever, the lesser the force at the fulcrum of movement.

Exercise:
Book openings