Motor Control Framework
Physical Therapy & Human Movement Sciences
Motor Control Framework

1. Observation and Description of Movement
2. Movement Analysis
3. Plan of Care to address Movement Dysfunction

1. Movement Observation/Description

**Movement Continuum** serves to organize movement observations and descriptions.

- **Initial Conditions**: Individual, task, environmental attributes
- **Preparation**: time period when the movement is being organized
- **Initiation**: instant when movement begins:
  - timing
  - direction
  - smoothness
- **Execution**: time period when the body segments are moving
  - direction
  - amplitude
  - speed
- **Termination**: instant when movement stops
  - accuracy
  - timing
  - stability

**Outcome**: success of goal attainment in task & environmental context
2. Movement Analysis

Knowledge of the person, task and environment and their interactions leads to hypothesis generation in these 4 domains about a patient’s movement.

- **Neural**
  - the neuronal structures, pathways, and processes that participate in the control of movement

- **Biomechanical**
  - the structure and properties of muscles, joints, and soft tissues and the physical laws governing movement

- **Physiological**
  - mechanisms of various systems of the body that contribute to the production of movement

- **Behavioral**
  - cognitive, motivational, perceptual, and emotional processes, as well as the outcome of movement in terms of either solving a motor problem or satisfying a goal in a particular environmental context
2. Movement Analysis

Examine the clinical components of movement to help rule in and rule out hypotheses.
3. Plan of Care to Address Movement Dysfunction

- Optimize movement and minimize activity and participation limitations
  - Set goals for patient collaboratively with patient
  - Identify interventions that are linked to underlying determinants
  - Seek evidence for effectiveness of interventions
Contextual Factors
Personal & Environmental

Movement Analysis – interaction of movement task, health condition & contextual factors ➔ neural, biomechanical, physiologic and behavioral motor control factors ➔ working hypotheses

Plan of care to address hypotheses
The MCF is not intended to be applied exclusively and is easily integrated in clinical practice with the Physical Therapist Patient Client Management Process (PTCCM), International Classification of Function and Disability (ICF) and Evidence Based Practice (EBP). The ICF, representing the whole patient, defines function as a complex interaction between the health condition and context (a). The MCF narrows the focus to movement related function (b). The MCF is applied within the basic clinical process described by the PTPCM. As part of the initial examination the PT observes the movement using the movement continuum as an organizing framework (c). The PT begins to analyze the movement in the evaluation stage of PTPCM by integrating knowledge about the health condition, the movement task and information gathered about the person’s experience (d). As the PT develops hypotheses about the reasons for the way a person is moving, they may be able to begin to rule in rule out hypotheses through examination (e). The 2 way arrows between movement observation, and analysis and examination and evaluation is meant to reflect this back and forth nature of the process to arrive at working hypotheses (f). Localization of movement dysfunction to motor control factors and knowledge of these factors directs treatment at multiple systems and levels of functioning (g). Principles of EBP are embedded throughout the entire process.