

Chapter 24-motor control and motor learning



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Principles of Motor Learning*Motor learning: learning and refinement of motor skills over time

-Takes place in a complex interaction between child and environment

-Refers to the intrinsic process that accompanies a child experiencing and participating in meaningful activities and the long-lasting changes in motor performance

-Based on principles of neuroplasticityNeuroplasticity*The ways the brain can change by laying down new circuitry and making new neural connections

-Occur when the brain receives new information/stimuli

-In response, permanent

changes happen in

the brain.

-Learning requires feedback, feedforward, practice, modeling and transfer of learning. ONCHAPTER 24-MOTOR CONTROL AND MOTOR LEARNING

SPECIFICALLY FOR YOUFOR ONLY\$13. 90/PAGEOrder NowPrinciples of Motor

Control*Motor control: the ability to regulate or direct the mechanisms essential to movement

-Role of CNS, techniques to quantify movement, nature and quality of the movement

-Addresses posture, mobility, and fine motor and gross motor skills; explores motor development throughout the lifespan

-Supports a dynamic systems approachPrinciples of Motor Control

(cont'd)*Dynamic systems theory: interplay between the neuromuscular system, the environment, cognition, and the intended task

*Change in one system affects the others.

*One task involves the dynamic interaction of many systems (e. g., visual,

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proprioceptive, tactile).

*To engage, one must have an intent to move (guided by a cognitive process).

*Change leads to neuroplasticity. Pillars of Motor Control*Interventions are meaningful.

-Children engage more and for longer when things are meaningful.

*Interventions closely mimic occupations of childhood.

*Intervention occurs in the

*setting similar to the natural

*context where the

*occupation takes place. Applying Motor Learning to Practice*Motor learning concepts can inform occupational therapy intervention.

-Use the concepts in a meaningful, occupation-based activity within the natural context. Feedback*Informs the learning about progress in acquiring new motor skills

*Before (feedforward) and after (feedback) performance

*Intrinsic (within the child)

*Extrinsic (provided by an external source)

*Verbal and nonverbal

*Consider type, timing, motor outcomes. Feedback (cont'd)*Feedforward: adjustments in anticipation of the movement required

-OT may help by discussing the movement required before doing it

*Feedback: adjustments based on performance

-OT may help by asking the child to reflect on the movement

*Intrinsic feedback: information a child received following a practice attempt

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(nervous system processes)

*Extrinsic feedback: provided by OT, others. Helpful in identifying errors in movement
Timing of Feedback*May be provided in various ways:

-Concurrent: during the movement

-Immediate: just following

-Terminal: right at the completion

-Delayed: after the movement has been completed and a time interval has transpired

*Sporadic (following some but not every trial) feedback was found to be more beneficial.

*Children respond to consistent extrinsic feedback at the beginning of a new skill, and then internalize it after practice. Modeling or

Demonstration*Providing visual information about how to perform a skill or task

-Most effective when presented in natural context

*Demonstrations are best if provided:

-Before practicing skill and in early stages of learning

-Slowly, without verbal feedback

-After emphasizing critical cues

-Throughout practice as frequently as is helpful
Verbal Instruction*Can be used to teach children and youth motor skill

-Practice is typically preceded or accompanied by verbal instruction or cues.

~Brief, 1-3 words

-Once the child completes key components, the OT may provide additional verbal instruction to refine movement.

-Providing repetitive practice

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with the same verbal instruction

reinforces learning Knowledge of Results and Knowledge of

Performance*Knowledge of results (KR)

-Information provided from external source about the outcome or end result

-Helps children retain newly learned motor skills

*Knowledge of performance

-Providing information about the nature or characteristic of the movement

-Helps children understand how they could adjust or change

movements Practice and Repetition*Repetition of motor tasks enhances brain development.

*Blocked practice: repeating the similar movements with short rest breaks

*Distributed: repetition of different skills spread over the course of the intervention with rest breaks

*Variable/random: practice of many different skills with periods of

rest Transfer of Learning/Generalization*Applying past learning to new situations

-Works best when client has opportunity for mastery of foundational skills first

-Then you incorporate different skills. Motor Control Principles in

Practice*Motor memory includes registration of the influence and the internal feedback from the motor output back into the sensory system.

-After this link is when learning occurs.

-Motor control is best addressed by engaging the child in meaningful activities that closely mimic occupations of childhood and occur in natural context. Degrees of Freedom*Joints vary in the amount of movement allowed, may be difficult for a child to control the movements

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-For fine motor tasks, a child must control the shoulder, wrist, elbow, and hand joints.

~To increase control, the degrees of freedom can be limited by holding or stabilizing the joint
Coordination and Timing*Coordination: activation of specific muscles together

-May be addressed by beginning with gross movements and progressing to more precise movements during intervention

-Also by encouraging postural stability during tasks

*Timing may be promoted by including music, rhythmic songs, or counting.

Strength and Muscle Tone*Strength: ability to contract a muscle or muscle group against gravity and resistance

-Children with motor deficits may have decreased strength and endurance, impacting occupational participation.

*Muscle tone: amount of tension in resting muscle or muscle group

-Discrepancies interfere with occupations.

-OT may focus on helping the child engage, allow him or her to refine motor skills