Glossary

**abnormal movement strategies**: Movement patterns that are inefficient, exaggerated, or stereotypic when an individual uses that movement pattern either in an activity or an isolated volitional movement.

**abulia**: A loss or deficiency of will power.

**acquired brain injury**: A brain injury that occurred after birth. The individual was considered to have a normal CNS prior to that injury.

**ACTH (adrenocorticotropic hormone)**: A hormone released by the adenohypophysis, which stimulates the adrenal cortex to secrete its entire spectrum of hormones. Thought to be immunosuppressive and antiinflammatory in treating multiple sclerosis.

**activity limitations (functional limitations)**: Difficulties an individual may have when executing activities.

**actuators**: Engineering devices that translate the inputs to perform the desired movement or task, drive a robot interacting with a human according to control inputs, or impose controlled actions on wearable robotics with reference trajectories.

**acute spinal cord injury**: The period of time immediately following an injury when the management of all primary injuries and the prevention of further complications are the emphasis of care.

**acute pain**: Pain that arises from nociceptor stimulation and functions as a warning system of impending or actual tissue injury.

**adaptation**: The process or state of changing to fit new circumstances or conditions.

**adaptive response**: An appropriate response to an environmental demand. Adaptive responses require good sensory integration; they also allow progression of the sensory integrative process.

**adjustment**: The ongoing process of responding to the world with a positive adaptive response that allows the person and significant others to grow and mature in regard to all aspects of life.

**advanced robotics**: The integration of enabling technologies and attributes embracing manipulators, mobility, sensors, computing, and hierarchical control to result in a robot capable of autonomously complimenting man’s endeavors in unstructured and hostile environments.

**adverse drug reactions**: An unexpected reaction following administration of a specific drug that has potentially negative affects on some system within the patient.
**agraphia**: Loss of the ability to write.

**aging**: A normal process of changing with time, especially during the later part of life.

**AIDS** *(acquired immune deficiency syndrome)*: A disease of the immune system caused by infection with the retrovirus HIV *(human immunodeficiency virus)* which destroys certain white blood cells and is transmitted through blood or bodily secretions such as semen.

**alcoholism**: A disease characterized by chronic, heavy consumption of alcohol, which may lead to peripheral nerve disease, cerebellar degeneration, and other systemic and psychiatric symptoms that impair health and the ability to function.

**alexia**: The inability to recognize or comprehend written or printed words; also known as word blindness.

**Alzheimer's disease**: A term used as a diagnosis when, based on the symptoms of confusion and impaired intellectual functioning, all other possible causes have been eliminated. It is not possible to ascertain whether a client has this disease until an autopsy or brain biopsy has been performed. At present, there is no known cause or treatment for Alzheimer's disease, but clients and families can be helped to improve coping skills with the presenting losses of intellectual functioning.

**amblyopia**: Dimness of vision not caused by refractive error or organic disease of the eye.

**Amigo**: A scooter-like, battery-operated vehicle.

**amniocentesis**: A procedure in which a needle is passed through the mother's abdomen and uterus into the amniotic sac of the fetus. Amniotic fluid is withdrawn and analyzed for a variety of abnormalities.

**amygdala**: A nuclear mass within the anterior portion of the temporal lobe involved with limbic function, especially arousal, motivation, and declarative learning.

**amyotrophic lateral sclerosis (ALS)**: A fatal degenerative disease of the central nervous system marked by axonal death in the lateral columns of the spinal cord with residual muscle weakness and atrophy. It is also called Lou Gehrig's disease.

**angiography**: The visualization of blood vessels by injection of a nontoxic radiopaque material.

**ankle-foot orthosis (AFO)**: An external device that controls the foot and ankle complex and can be utilized to generate forces around the knee.

**ANS (autonomic nervous system) pain**: Pain arising from injuries within the sympathetic or parasympathetic nervous systems.
anterior or toe lever arm: An orthotic device that creates a substitute for the strength of the anterior lever arm.

anterograde amnesia: The inability to establish new memories.

anticholinergic: Blocking the passage of impulses at cholinergic postsynaptic receptor sites; also an agent that has this effect.

anticipatory responses: The use of information about the environment and from experience to plan and program intended actions for the immediate future.

anticipatory postural adjustments: Similar to automatic postural responses but occur before the actual disturbance.

anxiolytic: An agent that reduces anxiety.

aphasia: An impairment caused by brain damage that interferes with the ability to process language symbols. It is disproportionate to impairment of other intellectual functions and is not caused by dementia, sensory loss, or motor dysfunction.

apraxia of speech: An articulatory disorder resulting from the inability to program the position of speech muscles and the sequence of muscle movements in order to volitionally produce speech. The disorder results from an impairment arising from brain damage.

ARM: Assistive Robotic Manipulator.

Arnold-Chiari malformation: A deformity in which the medulla and pons are reduced in size and the cerebellum herniates into the spinal canal.


aspiration: The act of inhaling fluids or substances into the lungs or the removal of fluids and gases from a cavity by suction.

assistive robotics: Robots designed to assist patients with the performance of tasks for eating/drinking, personal hygiene, work and leisure, mobility and reaching. Can also be divided into three main areas that include robots that operate in a fixed location, robots that can be moved around, and robots that attach to wheelchairs.

asthenia: The chronic lack of strength and energy.

astrocytoma: A malignant nerve-tissue tumor composed of comparatively large and much-branded astrocytes.

ataxia: The loss of muscular coordination.
ataxia-telangiectasia: An inherited disorder characterized by progressive ataxia, oculocutaneous dilation of terminal arteries and capillaries, sinopulmonary disease, and abnormal eye movements.

athetosis: From the Greek origin of the word: “without posture”; a dyskinetic condition that includes inadequate timing, force, accuracy, and coordination of movement in the limbs and trunk.

atypical movements: Not conforming to the usual type or expected pattern of movement.

augmented intervention: The use of therapeutic intervention strategies, such as the therapist’s hands, to augment or enhance the patient's ability to perform or participate in a functional activity or therapeutic procedure.

autism: A disorder that in childhood is characterized by withdrawal behavior, reduced socialization, perseveration, bizarre behavior, lack of purposeful verbal communication, and echolalia.

autogenic movement patterns (AMPs): Movements of body segments (e.g., head, limbs, trunk) that are the result of spontaneous activity of motor neurons; in contrast to reflexive or volitional (voluntary) movements.

autoimmune: A disease in which the body produces a disordered immunological response against its own tissue. Antibodies against normal parts of the body are produced to an extent that causes tissue injury.

automatic postural responses: Functionally organized, long-loop responses that produce muscle activation to bring the body's center of gravity into a state of equilibrium. Examples: ankle strategy, hip strategy.

automatic speech: Words or phrases spoken without voluntary control, such as curse words, expletives, and greetings.

autonomic dysfunction: An uncompensated reaction from either the parasympathetic or sympathetic division of the autonomic nervous system following disease, injury, or chemical imps; more often observed within the sympathetic nervous system as a reaction to a noxious stimulus that exhibits itself as a visceral response, such as sweating or increased heart rate.

autonomic dysreflexia: An uninhibited and exaggerated reflex response of the autonomic nervous system to stimulation. It is often referred to as autonomic hyperreflexia.

autonomic hyperreflexia: A reaction of the autonomic (involuntary) nervous system to over-stimulation. This reaction may include high blood pressure, change in heart rate, skin color changes (pallor, redness, blue-gray coloration), and profuse sweating.
**automatic postural responses**: A set of functionally organized, long-loop responses that act to keep the body in a state of equilibrium.

**axon damage**: Damage to a section of the nerve between the cell body and the presynaptic cleft or presynaptic junction.

**axonotmesis**: Interruption of the axon with subsequent wallerian degeneration; connective tissue of the nerve, including the Schwann cell basement membrane, remains intact.

**babbling**: A stage in speech development characterized by the production of strings of speech sounds in vocal play.

**balance**: The ability to control the center of gravity in a given sensory environment.

**ballistic movement**: High-velocity movement, such as a tennis serve or boxer’s punch, requiring reciprocal organization of agonistic and antagonistic synergies.

**basal ganglia**: A collection of nuclei at the base of the cerebral cortex. It includes the caudate nucleus, putamen, globus pallidus, and functionally includes the substantia nigra and subthalamic nucleus.

**base of support**: The surfaces of the body that experience pressure as a result of body weight and gravity, and the projected area between them.

**behavioral manipulations**: The use of modifications within the external environment such as exercise, or the use of modifications within the internal environment with tools such as hypnosis, operant conditioning, and biofeedback that will change the pain behavior of the patient.

**biasing motor generators**: Modulatory influence through synaptic excitation and inhibition over the resting state of the motor generators.

**biofeedback**: A cognitive treatment technique in which the client becomes aware of and learns to selectively change physiological processes with the aid of an external monitor.

**biomechatronics**: A unique engineering discipline responsible for integrating neuro-musculoskeletal appliances with biological systems to control and facilitate human-machine interactions and develop and interface sensors, actuators, and energy supply to create functional devices for human use.

**biopsy**: The removal of a tissue sample from a living person for laboratory examination.

**bite reflex**: A pathological reflex that is a swift biting action produced by stimulation of the oral cavity. In some cases, the bite may be difficult to release when an object such as a spoon or tongue depressor has been introduced into the mouth.
**body scanning:** A cognitive treatment technique in which clients are taught to view their pain objectively in order to separate themselves from it.

**Body weight supported treadmill system (BWSTS):** An apparatus that a therapist can use to un-weights a patient to various percentages of body weight while facilitating or assisting in walking on a treadmill.

**Body weight supported treadmill training (BWSTT):** The use of a BWSTS to trigger motor learning or relearning of human gait with the added component of increasing the amount of supported weight the patient must manage as well as the speed at which the individual is walking.

**bonding:** The process of creating a connection that results in trust and respect between two or more individuals.

**brain abscess:** A localized collection of pus in a cavity formed by the disintegration of brain tissue.

**brain-machine-brain interfaces:** Computerized technology connecting broad areas of the brain through bidirectional links to restore neurological functions such as hearing, seeing, touching, grasping, walking, or talking.

**brain machine interfaces (BMI):** Robotic devices and computerized exoskeletons that interface with the brain and the mind to control a body part or perform a task.

**bulbocavernosus reflex:** A reflexive response of the bowel triggered by fecal material. In patients with SCI a positive bulbocavernosus reflex means the tone of the internal and external anal sphincter is present.

**capitation:** A fixed payment or fee amount that can be charged or will be paid for a medical or therapeutic service.

**caregiver checklists:** A list of activities to be practiced as a home program given to the caregiver.

**cardiopulmonary complications:** Systems or medical complications that arise within the cardiac and/or pulmonary system. Complications can arise from internal disease or pathology or from the environmental demands placed upon the individual during life activities.

**caregiver training and support:** (1) Organizing educational experiences to assist caregivers to be better able to assist or perform needed tasks for patients; (2) organizing experiences (group or individual) to assist caregivers to cope with the challenges of performing as a caregiver. The support can be in the form of physical assistance or psychosocial activities.

**causalgia:** ANS pain characterized by intense burning and hyperesthesia throughout the distribution of an incompletely damaged peripheral nerve.
**center of gravity:** An imaginary point in space at which the sum of the body’s or system’s forces and movements equals zero (equilibrium).

**cerebellar atrophy (spinocerebellar degeneration):** A general term for several familial disorders in which the cerebellum deteriorates.

**cerebellum:** The part of the brain located directly below the occipital lobe and posterior to the other cerebral hemispheric lobes. Its main function is to control and coordinate muscular activities during motor programs such as balance.

**cerebellar disease:** Disease within the cerebellum that results in medically significant movement problems.

**cerebral evoked potentials (CEPs):** The study of potentials evoked from the brain’s cortex, including visually evoked potentials (VEPs) stimulated by light, auditory evoked potentials (AEPs) stimulated by sound, and somatosensory evoked potentials (SSEPs) stimulated by electrical stimulation of the peripheral sensory nerves.

**cerebral palsy:** A diagnostic term applied principally to a history of anoxia for a variety of reasons shortly before, during, or after the birth process, up to 2 years of age. The same conditions or experiences are often labeled with alternate diagnostic terms that vary with the geographical area and the clinic policy.

**chemotherapy:** The use of chemical agents to treat disease, infections, and other disorders, especially cancer.

**chewing reflex:** Pathological signs elicited in brain-damaged adults when the mouth is stimulated and repetitive chewing motions ensue.

**childhood aphasia:** A disturbance of the capacity to process language resulting from brain dysfunction in childhood.

**chorea:** Involuntary movements of the face and extremities that are of short duration, spasmodic, irregular; frequently involves a component of rotation.

**chronic pain:** Pain that occurs without a clear stimulus to the nociceptors in response to innocuous stimulation or in a prolonged exaggerated fashion to noxious stimulation.

**climbing fibers:** One of two fiber types carrying input to cerebellar cortex; terminates in a 1:1 relationship on a Purkinje cell.

**clinical electromyography:** An electrophysiological evaluation encompassing the observation, recording, analysis, and interpretation of bioelectric muscle and nerve potentials detected by needle electrodes inserted into the muscles for the purpose of evaluating the integrity of the neuromuscular system.
**clinical problem solving:** A method of analyzing specific questions that are difficult or perplexing, whose solution will be founded on actual observation and treatment of a patient as distinguished from data or facts obtained by experimentation or pathology.

**closure:** Visualization of the whole figure when only a portion is visible.

**CMS:** Centers for Medicare and Medicaid Services.

**CNS pain:** Pain arising from central nervous system lesions.

**cognition:** The mind processes that allow the individual to perceive and be aware of the self, objects, and others in a person's internal or external environment.

**cognitive-behavioral methods:** Treatment methods that deal with the sensory/discriminative, motivational/affective, and cognitive/evaluative aspects of pain.

**cognitive strategies:** Relaxation exercises; body scanning; humor; strategies taught to a patient using the patient's cognition and understanding of how to relax the motor system.

**cognitive human-robot interaction (cHRI):** Robotic control based on the wearer’s decision-making; the relationship between the human brain (e.g., use of speech, visual perception, calculation, attention, executive functions) and the robot that enables the exoskeleton to assist with task performance; cognitive interaction between the robot and the human for information processing to integrate cognitive information from the human operator with physical power to amplify performance or assist movement because of weakness or paralysis.

**cold application:** The use of cooling modalities to accomplish a therapeutic goal.

**coma:** A complete paralysis of cerebral function; a state of unresponsiveness. Clients do not obey commands, speak, or open their eyes.

**communication:** A reciprocal act of social interaction and sending/receiving information through conventional symbol systems (e.g., language) and affective messages (e.g., smiling). Customary rules of communication are established within individual social cultures.

**complete lesion:** A lesion in which there is absence of sensory and motor function in the lowest spinal segment.

**computerized learning based gaming:** The development of software and hardware integrating research on neuroscience to create fun, repetitive, progressive cognitive, sensory and physical activities that lead to learning.

**Computerized Tomography (CT) scan:** A medical imaging method that combines many x-ray images with the aid of a computer to generate cross-sectional views and, if needed, three-dimensional images of certain body structures.
complex regional pain syndrome (CRPS): Pain that arises from abnormal activity within the ANS. CRPS is classified into two distinct types: CRPS type I (formerly reflex sympathetic dystrophy) follows mild trauma without nerve injury, and CRPS type II (formerly causalgia) follows trauma with nerve injury. CRPS type I generally begins within the month after the injury, whereas CRPS type II can occur any time after the injury.

complex spatial relations: The relationship between one figure or part of a figure to another.

composite impairments: The combined effects of the primary and secondary impairments, motor recovery, treatment, and behavioral factors.

computed axial tomography (CT or CAT scan): An x-ray technique designed to show detailed images of structures on separate planes of tissue. When combined, these images can often detail multiple sclerosis lesions and other neurological deficits.

concentric contraction: The controlled shortening of the muscle.

conceptual disorders: A disturbance in thought processes, in cognitive activities, or in the ability to formulate concepts.

configuration: The overall shape or enclosure of a figure.

constancy: The invariant quality of distinctive features in spite of valuation in location, rotation, size, or color.

contrecoup injury: An Injury to the brain produced distant to the part sustaining the blow.

controllers: Engineering devices that control range, speed, and type of movement produced by the robotic device.

Copaxone (glatiramer acetate): An artificial protein that resembles a natural myelin protein. It is not known exactly how the medication works, but it may help people who have multiple sclerosis by preventing the body's immune system from attacking the myelin coating that protects nerve fibers. It is used with relapsing-remitting MS which is a form of MS in which symptoms randomly flare up (relapse) and then improve or fade (remission).

coping: Behaviors used to respond to positive or negative stressors in a person's environment in an effort to overcome or deal with them.

copolymer 1 (Copaxone, glatiramer acetate): A drug under study by TEVA Pharmaceuticals (Kulpsville, PA), which in clinical trials is reported to reduce the frequency of relapses in early exacerbating/remitting MS.

cor pulmonale: Heart disease due to pulmonary hypertension secondary to lung disease with right ventricular hypertrophy.
cortisone, prednisone: Synthetic adrenal glucocorticoids used in the treatment of multiple sclerosis to reduce edema and other aspects of inflammation. They are immunosuppressive and also have been proven useful in improving nerve conduction in demyelinated fibers.

coup injury: Injury to the brain at the site of the impact.

CPT (current procedural terminology): A code set published by the American Medical Association designed to identify the interventions and other services performed by health care providers.

crouch-control ankle-foot orthosis: An ankle-foot orthotic device that is controlled at the pelvis.

cryosurgery: The technique of exposing tissues to extreme cold to produce well-demarcated areas of cell destruction. The cold is usually produced by use of a probe containing liquid nitrogen; in rare cases, used to destroy thalamic tissue in persons with MS to control severe tremor and other involuntary movements.

cytokines: Any of a class of immunoregulatory proteins (e.g., interleukin, tumor necrosis factor, and interferon) secreted by cells, especially of the immune system.

declarative memory: The mental registration, retention, and recall of past experiences, sensations, ideas, knowledge, and thoughts. Declarative memory has a high cognitive basis. The original data must relay through the amygdala or hippocampal nuclear structures before long-term storage is possible.

deconditioning: A process that occurs to the human body following disuse that negatively impacts the ability to perform activities of daily living and participate in life.

decorticate rigidity: A term derived from animal transections, sometimes used to describe abnormal posturing in humans, and is characterized by exaggerated flexor responses in the upper extremities and exaggerated extensor responses in the lower extremities. In reporting, it is preferable to describe the posture observed.

decubitus ulcer: An ulcer resulting from pressure to an area of the body, usually from a bed or chair. The heels, sacrum, ischia, and trochanters are most prone to the development of these ulcers.

depth vein thrombosis: The existence of a blood clot within a deep vein.

deiter nucleus: One of the vestibular nuclei, also known as the lateral vestibular nuclei; located in the brain stem.

delayed language: The failure of language to develop at the expected age because of any number of causes such as hearing loss, emotional disturbance, or brain injury.
delegation: The giving of some power or responsibility to an assistant, an aide, or a family member.

delirium: A condition in which a person shows a change in both intellectual function and level of consciousness. The client is less alert than normal and may be confused, disoriented, forgetful, and/or sleepy. Other commonly used terms to describe this condition are acute brain syndrome and reversible brain syndrome. If the underlying medical or emotional problem(s) is treated in a timely fashion, the level of alertness and intellectual function will return to normal.

dementia: An impairment in some or all aspects of intellectual functioning in a person who is clearly awake. Other terms used to describe this condition are organic brain syndrome, senility, senile dementia, hardening of the arteries, and shrinking of the brain. Some diseases that can cause dementia are treatable. In these diseases the distortion of intellectual capacity is reversed when treatment is given and/or the intellectual functioning is prevented from becoming worse.

demyelination: The process of breakdown or destruction of the myelin sheath surrounding the axons of nerve tissue.

dentate nucleus: One of the deep cerebellar nuclei; found lateral to the emboliform nucleus, within the cerebellar hemisphere; receives fibers from the lateral zone of the cerebellar cortex; fibers leave nucleus via brachium conjunctivum; is considered part of the neocerebellum.

developmental coordination disorder: Problems with movement coordination that manifest themselves when an individual is a child.

developmental disabilities: Problems that limit one’s functional ability caused by lack of development or damage to the nervous system; affects the child’s and later the adult’s ability to participate various activities of life.

developmental dyspraxia: A disorder of sensory integration characterized by an impairment in the ability to plan skilled nonhabitual movement.

developmental handling: Moving a child through part or all of the developmental sequence to enhance the expression of normal movement patterns (i.e., righting and equilibrium reactions).

developmental theory: A systematic statement of principles and generalizations that provides a coherent framework for studying development.

Dexter hand: A computerized hand-evaluation system that measures and tracks range-of-motion of joints, and sensation, power, motivation, and endurance of muscle.

Diagnosis by a physical or occupational therapist: The conclusions drawn following a thorough examination that clearly identify the activity limitations of the individual and the system and subsystem impairments that are causing those limitations. These profession-specific conclusions are measurable and lay the foundation for prognosis and selection of treatment.
interventions and are based on disablement/enablement or human performance-based models.

**diagnostic model: examination, evaluation, diagnosis, prognosis, and intervention:** A model used by movement specialists to describe the process used when analyzing clients with movement dysfunction in order to identify impairments and functional limitations (where a patient has and does not have activity limitations), and how intervention would increase the client’s ability to participate in life and increase that quality.

**diastematomyelia:** The congenital division of all or part of the spinal cord.

**Differential Diagnosis Phase 1:** The first aspect of differential diagnosis that occurs when a therapist performs medical screening to identify if the movement problems fall within their respective scope of practice or should be referred to another practitioner.

**Differential Diagnosis Phase 2:** The second aspect of differential diagnosis that occurs once a therapist has identified that the movement dysfunction falls within his/her scope of practice; the therapist must then examine, evaluate, and identify the movement problems, give a prognosis for the potential durations and outcome of treatment, and clearly identify with the assistance of the patient and/or family the treatment protocol that will best match the desired outcomes.

**dioptic power:** A unit of measurement of the refractive power of an optic lens.

**diplopia:** Double vision.

**direct intervention:** Hands-on therapy to enhance the possibility of new motor learning when movement and postural control is inadequate.

**disability:** Any restriction or lack of ability to perform an activity in a normal manner or within the normal range. Examples: requires a cane to walk, requires assistance to transfer, etc.

**disablement model:** An evaluation and treatment model based on the specific impairment, functional loss, and quality of life attainable; the disablement model is not based on the medical diagnosis or disease process of the injury.

**distal sparing:** A condition in which the spinal cord below a congenital lesion remains intact. The reflex arc through the spinal cord remains but is unmodified by supraspinal influences. May result in spastic movements distal to the level of the lesion.

**disuse atrophy:** The reduction in size and number of muscle from lack of use of that muscle in normal activities of daily living.

**disease:** A condition that results in medically significant symptoms. Disease can be acute or chronic and usually has recognizable signs and symptoms often having a known cause.
**double-adjustable ankle joint**: An orthosis that is both adjustable and supports the ankle joint on both the lateral and medial sides.

**drug interactions**: The effect a drug has upon various bodily systems or the summation of the effects of various drugs upon bodily systems. These drug interactions can be positive and negative depending on the body systems reaction to its influence.

**drug disposition**: The absorption, distribution, metabolism, and excretion of a drug.

**drug therapy**: The use of a natural or artificial substance to treat, prevent, or diagnose a disease; to lessen pain; or to modify an abnormal movement response during activities.

**Duchenne muscular dystrophy**: A form of muscular dystrophy that attacks the muscles of the upper respiratory and pelvic areas first, with a higher incidence in boys than girls.

**ductions**: Movements of one eye from the primary position into the secondary or tertiary positions of gaze.

**dynamic equilibrium**: The ability of clients to adjust to displacements of their center of gravity by appropriately changing their base of support.

**dysarthria**: A disorder of articulation resulting from impairment of the central or peripheral nervous system in the control of the muscles of speech—errors in articulation of speech sounds.

**dysdiadochokinesia**: The inability to perform rapidly alternating motion.

**dysesthesias**: A condition in which sensation is impaired but not absent. Often used when referring to “pins and needles” sensation.

**dyskinesia**: A defect in voluntary movements.

**dysmetria**: An inability to position the limbs accurately with respect to another object.

**dysphagia**: A disorder of swallowing.

**dystonia**: An abnormal involuntary sustained movement or posture involving the contraction of a group of muscles.

**dystrophin**: A protein that is missing or defective in Duchenne muscular dystrophy which is localized to the sarcolemma of the muscle cell membrane. Its absence results in abnormal cell permeability, which may lead to cell destruction.

**eccentric contraction**: The controlled lengthening of a muscle.

**echolalia**: The automatic reiteration of words or phrases that have been heard.
**ecology:** The study of the environmental relations of organisms.

**edema:** An abnormal buildup of serous fluid between tissue cells.

**effectiveness in practice:** The effective results of an intervention demonstrated by objective measurement.

**ego-dystonic:** Destructive to self-enhancement.

**ego-syntonic:** Supportive of self-enhancement.

**electrical stimulation:** The study of muscle response to electrical currents including reaction of degeneration (RD), rheobase and chronaxy, strength-duration (SD), and galvanic-tetanus ratio tests.

**electroencephalography (EEG):** The study of the electrical activity of the brain.

**electroglottography:** The process of measuring changes in electrical potential across the glottal tissue membrane.

**electromyographic biofeedback (EMGBF):** The use of electronic instrumentation to elevate normally subconscious electromyographic potentials to a conscious level through auditory or visual signals, so that muscle contractions may be facilitated, inhibited, or coordinated for neuromuscular activity.

**electroneuromyography (ENMG):** The electrical activity of the muscles and their associated motor and sensory nerves.

**electronystagmography:** The study of eye movements to evaluate vestibular function.

**electrophoresis:** The movement of charged particles through the medium in which they are dispersed as a result of changes in electric potential; useful in analysis of protein mixtures because protein particles move with different velocities.

**electroretinography:** The study of the potentials produced by the light-sensitive tissues of the retina.

**emboliform nucleus:** One of the deep cerebellar nuclei in humans; receives input from intermediate zone of the cerebellum; involved in control of posture and voluntary movement.

**emotional behavior:** The motor behavior activated by chemical reactions induced by emotional responses. The motor patterns activated by specific emotions elicit specific pattern generators.

**emotional entertainment robots:** Mechatronic robotic devices that exhibit animal like behaviors to increase emotional comfort and give some emotional relief for people who live alone.
**empowering robotic exoskeletons:** A class of robots that extend the strength of the human beyond its natural ability while maintaining human control of the robot; used to be called extenders.

**empowerment:** The process by which power or authority over all aspects of self is reassumed by the client; in rehabilitation, providing a sense of motivation to help the patient adapt to and influence his/her own environment.

**enablement model:** A model that focuses on the functional abilities and potential of a patient with movement dysfunction and engages and empowers that individual to be successful with activities of daily living and participation in life.

**encephalitis:** Inflammation of the brain tissue.

**encephalomeningitis:** Inflammation of the meninges and the brain substance.

**end-feel:** The sensation experienced by therapist at the end of a patient's passive range of motion. It may be springy or an abrupt halt, bone-to-bone, capsular, or tissue approximation.

**endogenous opiates:** Naturally occurring substances that produce opiate-like effects, including analgesia.

**endoscopy:** The examination of organs accessible to observation through an endoscope (small tube with light camera) inserted through the mouth.

**energetic-based theories:** Theories based on the assumption that there is an energy field around and through the human body that can be used as a therapeutic modality to help the patient and/or practitioner correct the energy imbalances that are causing health issues. Once these balances are corrected, healing will begin and continue as long as the imbalance is not reassumed.

**energy conservation:** Movement activities that reduce the amount of energy needed by the individual when participating in life.

**environmental modification:** The external changes within the environment of the patient that will empower that individual or the family to function with less stress, physical demands, and/or frustration.

**epicritic:** The somatic sensations of fine discriminative touch, vibration, two-point discrimination, stereognosis, and conscious and unconscious proprioception.

**ergotropic:** The combinations of cortical alpha rhythm, sympathetic nervous system activity, and somatic muscle activation; activity or work state.
evaluation: A process used by therapists to analyze the results of an examination and determine the best course of intervention given all the internal and external environmental variables.

evidence-based practice: Interventions that are selected because of the objective and identifiable evidence available to justify those decisions. Evidence can be based either on effectiveness as measured through objective, reliable, and valid instrumentation or through controlled efficacy studies.

evoked potentials: The electrical manifestation of the brain's reception of and response to an external stimulus; a way of measuring efficiency in the CNS.

exacerbating-remitting: An unpredictable disease course characterized by episodes of symptom appearance or worsening followed by partial or complete recovery.

exacerbation: An increase in the symptoms of a disease or pathology.

examination: A set of identifiable measures used to collect objective data regarding the individual's functional limitations or system/subsystem deficits (impairments).

exercise: Physical or mental activity or movement, especially when it’s use is intended to keep a person alert, fit, and healthy. A series of actions, movements or tasks performed repeatedly or regularly as a way of practicing and improving a skill or procedure.

exercise tolerance: The ability of the individual to perform exercise without harm or danger to any system such as the heart, lungs, and/or circulatory system.

exoskeletons: A dynamic orthotic device that maps on to the human actor’s anatomy and is controlled by the human to extend function through a set of actuators and a rigid structure to transmit force; exoskeletons can be for the full body, the trunk or the limbs.

experimental allergic encephalomyelitis (EAE): An inflammatory autoimmune disease that has been induced in laboratory animals (especially mice) by injecting them with diseased tissue from affected animals or with myelin basic protein; because of the similarity of its pathology to multiple sclerosis in humans EAE is used as an animal model for studying the condition.

experimental autoimmune encephalomyelitis (EAE): An induced, laboratory model of multiple sclerosis characterized by inflammation and demyelination.

exteroceptive: Receptors activated primarily by stimuli from the external environment.

extrafusal muscle: Striated muscle tissue found outside the muscle spindle.

extrinsic ophthalmoplegia: Paralysis of the extrinsic ocular muscles.
**eye disease:** Any systemic or local disease that affects visual function; may cause a reduction in visual acuity (being able to see clearly with central vision) or some type of visual field defect.

**Faces pain scale:** An established and reliable pictorial example of facial expressions to help the patient identify his/her level of discomfort.

**F^2^ ARV continuum:** A continuum that begins with fear or frustration and proceeds to anger, range, and violence, in that order. A highly volatile emotional reaction that escalates as the emotions mount.

**family:** A group of people living together, such as parents and children or a group of people who are closely related by birth, marriage, or adoption.

**family involvement:** The interactions of significant others in a person's life that relate to an individual's development and coping.

**family network:** A large and distributed group of people that support the family and work together as a unit or system.

**family priorities:** The importance of services and intervention goals based on family values and preferences.

**fast pain:** The sensation first perceived after injury; it is localized, easily qualified, and lasts as long as the duration of the stimulus.

**fastigial nucleus:** One of the deep cerebellar nuclei; receives input from the medial zone of the cerebellum; involved in the control of equilibrium and posture.

**fatigue:** Extreme tiredness resulting from physical or mental activity with a temporary inability of an organ or part such as a muscle or nerve cell to respond to a stimulus and function normally, following continuous activity or stimulation.

**feedback:** Information regarding the relative accuracy or qualitative performance of a task. To be considered feedback, the information must be useful to the learner in order to modify the performance of the task.

**fine motor coordination:** Motor behaviors involving manipulative, discrete finger movements and eye-hand coordination; requires corticospinal tract innervation for intentional fine motor control.

**flaccidity:** The absence of voluntary, postural, and reflex movements resulting in muscle laxity and lack of resistance to passive stretch; this condition results from destruction of all or practically all peripheral motor fibers supplying a muscle.
forced use: An intervention strategy that requires the patient to use an extremity while participating in a functional activity. It may require either restraining the opposite extremity or require bilateral use of two extremities.

function: An action or use for which something is suited or designed. For example, the heart’s function is to pump blood through the lungs for oxygenation and again through the body to get that oxygen to the cells for metabolism and retrieval of waste produces from those same cells.

functional activities: The activities normally performed by an individual as part of daily life such as dressing, eating, bathing, grooming, socially interacting, and working.

functional electrical stimulation (FES): The use of electrical stimulation of the peripheral nervous system to activate muscle contractions to assist in functional activities, such as walking or upper extremity function.

Functional Independence Measure (FIM): A reliable, valid measurement tool of an adult's ability to perform various daily living skills.

functional limitations: Those normal daily living activities that an individual has difficulty performing.

functional skills: Activities normally considered as part of an individual’s daily living.

functional training: The intervention strategy that uses a functional activity as the treatment itself and assumes that the functional movement strategy necessary for that activity is available to the patient to practice.

functional visual skills: Skills that include eye aiming, eye alignment or eye posture, oculomotilities, and depth perception.

gag reflex: Also known as the pharyngeal reflex; an involuntary contraction of the pharynx and elevation of the soft palate elicited in most normal individuals by touching the pharyngeal wall or back of the tongue.

game console: The machinery needed to operate software packages for play and learning.

Gamma knife: A trademarked medical device used in noninvasive surgery that emits a highly focused beam of gamma radiation.

gate control theory: The pain modulation theory developed by Melzak and Wall who proposed that presynaptic inhibition in the dorsal gray matter of the spinal cord results in blocking of pain impulses from the periphery.

gaze-evoked nystagmus: Abnormal oscillation of the eyes when attempting to fixate gaze on an object.
**gestalt form, space, concept**: The configuration of separate units into a pattern that itself seems to function as a unit or a whole.

**general adaptation syndrome (GAS)**: A protective response of the autonomic nervous system that causes relaxation with stress versus anxiety and high blood pressure.

**genetic disorders**: Errors with the human gene that are found in specific disease states and can cause functional limitations in an individual’s development.

**glial cell**: A supportive cell in the brain and spinal cord. Glial cells do not conduct electrical impulses as opposed to neurons. They surround neurons and provide support for them and insulation between them. Glial cells are the most abundant cell types in the CNS. There are three types of glial cells: astrocytes, oligodendrocytes and microglia.

**glioblastoma multiforme**: A highly malignant, rapidly infiltrating, primary brain tumor with tentacles that may invade surrounding tissue. This provides a butterfly-like distribution pattern through the white matter of the cerebral hemispheres. The tumor may invade a membrane covering the brain (the dura) or spread via the spinal fluid through the ventricles of the brain.

**gliosis**: An excess of astroglia in damaged areas of the central nervous system.

**globose nucleus**: One of the four deep cerebellar nuclei in humans; receives input from intermediate zone of the cerebellar cortex; involved in control of posture and voluntary movement.

**goal setting**: The establishment of realistic outcomes from a specific interventions strategy which can be goals within a specific time frame or steps toward a desired long term functional outcome following an extended plan of care.

**goal-oriented movements**: Movements that are organized around behavioral goals, environmental context, and task specificity. Formerly known as voluntary movements (in contrast to reflexive movements).

**gross motor coordination**: Motor behaviors concerned with posture and movement, ranging from early developing behavioral patterns to finely tuned, highly complex functional activities. Based on axial/trunk movement patterns versus distal control and requires the regulation over the ventral/medial and lateral descending motor tract systems.

**Guillain-Barré syndrome**: A nervous system disorder resulting nerve damage caused by the body’s own defenses (immune system), usually in response to an infection or other illness. GBS causes muscle weakness, loss of reflexes, and numbness or tingling in the arms, legs, face, and other parts of the body. It may progress to complete paralysis and is the most common medical cause of acute paralysis.

**habilitate**: Supplying an individual with the means to develop never-before obtained maximum independence.
**handling:** The physical contact with the client's body that directly guides the movement and postural adaptation to a more normal pattern; usually refers to functional movement patterns used in daily care.

**haptic feedback:** The sensory interface of the patient and the object being manipulated.

**health promotion:** Encouraging consumer behaviors most likely to optimize health potentials (physical and psychosocial) through health information, preventive programs, and access to medical care.

**hemiplegia:** Paralysis on one side of the body that causes movement dysfunction in the arm and leg. This movement problem can also involve the face, swallowing, eye function, and language.

**higher cortical processing:** Refers to the functions of the many association areas of the cerebral cortex, including memory, learning, and associating multiple pieces of information from a variety of sensory and motor sources. Outcomes of this processing include something as relatively simple as stereognosis or complex as mathematical processing, abstract thinking, or art. Simply stated, higher cortical processing results in gnosis (knowing).

**high-risk clinical signs:** Clinical signs that are present and highly predictive of the child having cerebral palsy. At 1 to 2 months after term (40 weeks of gestation) stiff, jerky movements or a paucity of movement are considered high-risk; while at 4 months of age, hypertonicity of the trunk or extremities are recognized as high-risk clinical signs.

**hip-knee-ankle-foot orthosis (HKAFO):** A device that controls all lower extremity segments.

**HIPAA:** Health Insurance Portability and Accountability Act.

**Hippocampus:** A nuclear complex forming the medial margin of the cortical mantle of the cerebral hemisphere. It forms part of the limbic system and projects by way of the fornix to the septum, anterior nucleus of the thalamus, and the mamillary body.

**holistic:** The spiritual dimension of a health care model.

**holistic (wholistic) model for health care delivery:** A delivery of health services that embraces all forms of potential clinical management, has the patient as the central focus, and empowers the patient and family to the responsibilities that entails.

**homeostasis:** The maintenance of a steady state; in particular, the maintenance of the internal (physiological milieu) and the maintenance of safety or viability in the external environment.

**homonymous hemianopsia:** The loss of the same side of the field of vision in both eyes.

**hospice care:** Assistance given to the family and patient during the final stages of life. Hospice care focuses on quality of life not on recovery.
human immunodeficiency virus (HIV): Either of two strains of retrovirus that destroys the immune system's helper T cells, the loss of which causes AIDS.

human robotic interfaces (HMI): Hardware and software links that connect two dissimilar systems (robot and human); interfaced when operations are linked informationally, mechanically or electronically the power between the actor and the limb.

humoral: Pertaining to any fluid or semifluid of the body.

Huntington disease: An inherited disease with degeneration of the basal ganglia and cerebral cortex; characterized by choreiform movements and loss of cognitive functions.

Hydrocephalus: An abnormal increase of cerebrospinal fluid around the brain, resulting in infants in an enlargement of the head because the bones of the skull are still unfused. In adults hydrocephalus is usually caused by a trauma or inflammation within the brain that causes an excessive production of cerebrospinal fluid. Without a release for that fluid secondary trauma can cause damage to peripheral gray matter affecting all aspects of cortical function.

hyperbaric oxygen: Oxygen under greater pressure than at normal atmospheric pressure (usually at 1½ to 3 times absolute atmospheric pressure). Thought to be immunosuppressive in treating multiple sclerosis.

hypermetria: The distortion of target-directed voluntary movement in which the limb moves beyond the target.

hypertonicity: The quality or state of being hypertonic.

hypoesthesias (hypesthesia): Abnormally decreased sensitivity to stimulation.

hypnosis: A cognitive treatment technique that involves changing pain perception while the client is deeply relaxed.

hypometria: The distortion of target-directed voluntary movement in which the limb falls short of reaching the target.

hypotonicity: The reduced resistance to passive stretch; displayed as an inability to hold resting posture against gravity; limp, “floppy” extremities during passive movement.

ICD-9-CM: An abbreviation for *International Classification of Diseases, Ninth Revision, Clinical Modification*. It is a tabular list of medical diagnoses approved for use by the CMS and is based on the World Health Organization’s ICD-9 originally published in 1977.

immunoglobulin: Any one of several proteins that are capable of acting as antibodies. May be found in plasma, urine, and cerebrospinal fluid. IgG is an immunoglobulin.
**immunosuppression**: The inhibition of the immune response, usually deliberately by administrating drugs to prevent rejection of transplanted organs but sometimes resulting from disease as in the case of AIDS.

**impairment**: Any loss or abnormality of psychological, physiological, or anatomical structure or function. In the ICF model, impairments are defined as are problems in body function or structure such as a significant deviation or loss. Examples: loss of joint mobility, weakness, sensory loss.

**impairment training**: An intervention strategy that assumes that with specific system or subsystem training, the individual will regain control over a specific or multiple functional activities.

**imprinting casting**: The application of casting material to subject the body part to consistent input for a specified period of time. This allows the central nervous system to “learn” the warranted response.

**incomplete lesion**: A lesion in the spinal cord in which partial preservation of sensory and/or motor function is found below the neurological level and includes the lowest sacral segment.

**incontinence**: An inability to control urination or defecation so that either may take place involuntarily.

**indirect intervention**: Instruction of parents and other caregivers to modify their daily care of the child or individual to open new possibilities for motor learning and preventing expression of abnormal movement patterns.

**inferior olivary nucleus**: A large nucleus in the anterolateral medulla; origin of climbing fibers to the cerebellum.

**inpatient services**: Services delivered to the patient during hospitalization.

**input systems or modalities**: The ways specific information enters into the nervous system to inform the brain about the external world.

**integrating theories**: A process of analyzing and coordinating separate elements within different theories and creating a balanced whole that includes those components that are compatible or work together while also identifying those aspects that contradict or seem to be in conflict.

**intention tremor**: An abnormal tremor of 4 to 6 Hz that occurs during voluntary, goal-directed movement.

**interferon**: A protein formed when cells are exposed to viruses and other stimuli. Noninfected cells exposed to interferon are protected against viral infection. Thought to be of use in treating multiple sclerosis.
**intermediate region of the cerebellum cortex:** A longitudinal zone of the cerebellar cortex; located on either side of the median zone; involved in the control of posture and voluntary movement; projects to globose and emboliform nucleus in humans and the interpositus nucleus in lower animals.

**intermittent catheterization:** Intermittent placement of an external device or sterile tube between the urethra and the bladder to eliminate urine from the body.

**internal ophthalmoplegia:** Paralysis of the intrinsic muscles of the eye—those of the iris and ciliary body.

**interoceptive receptors:** Receptors activated by stimuli from within visceral tissues and blood vessels.

**interpositus nucleus:** One of the deep cerebellar nuclei in lower animals (globose and emboliform in humans); receives input from intermediate region of the cerebellar cortex; involved in the control of posture and voluntary movement.

**intrafusal muscle:** The striated muscle tissue found within the muscle spindle.

**intuition:** The state of being aware of or knowing something without using known sensory input systems or without actual evidence for that knowledge.

**iontophoresis:** The use of direct current electricity to drive chemical ions into the body for therapeutic purposes.

**isometric contraction:** Muscle tension without muscle shortening.

**isotonic contraction:** The contraction associated with shortening or lengthening of the muscle tissue; can be either concentric or eccentric.

**jaw jerk:** Closure of the mouth caused by striking the lower jaw while it hangs passively open. This reflex is rare in normal individuals.

**joint mobilization:** The graded passive oscillations at a joint for the purpose of increasing range of motion.

**Karnofsky Performance Status Scale:** A functional performance scale designed as a functional measurement prognostic tool specifically for individuals who have undergone surgery for a brain tumor. The specific scale can be found in Table 25-1.

**knee-ankle-foot orthosis (KAFO):** An orthosis or brace that controls the movement function and interaction between the knee, ankle, and foot.

**kinematics:** The analysis of movement using computerized systems which measure force, velocity, timing and direction of movements.
kinesiological electromyography: The study of the muscle activity produced by motion.

knowledge of results (KR): Augmented information provided about success or errors in achieving environmental goals.

kyphosis: The exaggeration or angulation of the normal posterior curve of the spine.

language: A code for representing feelings and ideas about the world through a conventional system of signals (such as sign language) or symbols (such as spoken or written words). Language includes understanding and producing the conventional symbols and the rules for combining and using symbols.

language disorder: A complete or partial disruption in the ability to understand and produce the conventional symbols or words that constitute one's native language, not directly attributable to sensory loss (e.g., blindness, hearing loss) or motor impairments.

laser: A device that produces a coherent, monochromatic beam of light that can be used therapeutically for pain management, as well as for surgical procedures.

lateralization: The tendency for certain processes to be more highly developed on one side of the brain than on the other. In most people, the right hemisphere develops the processes of spatial and musical thoughts, and the left hemisphere develops the areas for verbal and logical processes.

lateral region of the cerebellar cortex: A longitudinal zone of the cerebellar cortex; located lateral to intermediate zone; comprises bulk of cerebral hemispheres; involved in the control of skilled voluntary movement; receives projection from motor cortex and has output to dentate nucleus.

learning disability: A disorder in one or more of the basic physiological processes involved in understanding or using spoken or written language. This may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or doing arithmetic. They include conditions that have been referred to as, for example, perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. They do not include learning problems that are primarily caused by visual, hearing, or motor handicaps, mental retardation or emotional disturbance, or environmental disadvantage.

learning environment: All the conditions (internal and external), circumstances, and influences surrounding and affecting the learning of the client.

learning theory: The theoretical basis used to describe changes in behavior or performance, whether declarative, procedural, or some combination of both.

lesion: A physical change in a body part that is the result of illness or injury such as a head trauma that damages brain cells and creates lesions that can be measured objectively as a change to the CNS.
**leptomeningitis:** Inflammation of the arachnoid and pia mater layers of the meninges. The same condition may be referred to as meningitis.

**life span disability:** A mental or physical limitation that will prevent the individual from participating in activities either considered normal for daily living or social interaction throughout the life span of that person.

**ligation:** Application of a ligature (a ligature being any material used for tying a vessel or to constrict a part).

**limbic system:** A group of brain structures that include amygdala, hippocampus, dentate gyrus, cingulate gyrus, and their interconnections with hypothalamus, septal areas, and brain stem.

**limits of stability (LOS):** The boundary or range that is the farthest distance in any direction a person can lean away from vertical (midline) without changing the original base of support (stepping, reaching, etc.) or falling.

**lipomeningocele** A mild form of spina bifida. There is a fatty tumor over the spine. There may not be much nerve damage, but urinary and bowel problems are possible.

**lipofuscin:** Any of a class of fatty pigments formed by the solution of a pigment in fat.

**long-loop stretch reflex:** Stretch reflex mediated through centers above the spinal system.

**loss and grief:** The process of dealing with the removal of function or roles in a person's life.

**lower motor neuron:** A motor neuron with a cell body located within the nervous system and with axons that leave the CNS to move toward a preestablished destination, such as a myoneural junction of striated muscle, to smooth muscle or to an organ.

**magnetic resonance imaging (MRI):** A scanning technique that uses magnetic fields and radio frequencies to produce a precise image of the body tissue; used for diagnosis and monitoring of disease.

**massage:** The manipulation of the soft tissues of the body to affect the nervous, muscular, respiratory, and circulatory systems.

**McGill pain questionnaire:** A pain character measurement tool in which clients are asked to select words that describe their pain from a series of word categories.

**Mechatronics:** The body of knowledge that combines precision mechanical engineering, electronic control, and systems thinking in the design of products and processes. This includes the use of computerized technology and robots for the restoration of a person to an optimal level of physical, mental, and social function, and defines the broad scope of robotics.
medial zone of cerebellar cortex: The longitudinal zone of the cerebellar cortex, which includes the vermis and the flocculonodular lobe; involved in control of equilibrium and posture; projects to fastigial and vestibular nuclei.

medical screening: A process used by physical and occupational therapists as part of their health screening for each patient in order to differentiate problems that are within a OT/PT's scope of practice and those clinical signs that should guide the therapist to refer the patient to another medical practitioner.

Medicaid: A program funded by the U.S. and state governments that pays for medical expenses of people who are unable to pay some or all of their expenses.

Medicare: A health insurance program in the U.S. under which medical care and hospital treatment is provided for people over 65 or individuals who are considered disabled.

meningioma: A slow-growing benign tumor that affects the meninges of the brain or spinal cord and may cause serious damage by compression of the nervous system within its skeletal frame.

meningitis: Acute inflammation of the meninges covering the brain and spinal cord.

mental imagery: The mental visualization or rehearsal of performance of a motor task.

metencephalon: The cephalic part of the rhombencephalon, giving rise to the cerebellum and pons.

Microprocessors: Small computer units that can receive, store, and send data electronically.

minimal brain dysfunction: A mild or minimal neurological abnormality that causes learning difficulties in the child with average intelligence.

mobile arm support: An orthotic device that supports the upper extremity and allows the individual to move the extremity with limited motor function.

model of human occupation: A model that addresses the motivation for occupation, the patterning of occupational behavior into routines and lifestyles, the nature of skilled performance, and the influence of environment on occupational behavior.

modulation: A variation in levels of excitation and inhibition over sensory and motor neural pools.

morphogenesis: The morphological transformation including growth, alterations of germinal layers, and differentiation of cells and tissues during development.

mossy fibers: One of two fiber types that carry information to the cerebellar cortex.
**motion controllers**: The sensor device for detecting human movement based on accelerometers, infrared light, ultrasound, depth sensors, or cameras.

**motor control**: The ability of the central nervous system to regulate and/or direct the musculoskeletal system in purposeful acts.

**motor control theory**: Theoretical basis for understanding how the motor system is controlled within the human body.

**motor coordination**: Functions that are traditionally defined as motoric. Includes gross motor, fine motor, and motor planning functions.

**motor dysfunction, motor deficit, motor disorder, motor disturbance**: Generic terms for any type of disorder that has a motor component and is found in learning-disabled children.

**motor lag**: A prolonged latent period between the reception of a stimulus and the initiation of the motor response.

**motor learning**: The acquisition of skilled movement based on previous experience and functional outcomes. The process by which a person acquires accuracy and high quality in performance of a motor task.

**motor learning stages**: The process through which a learner acquires, refines, and retains a new motor skill, in which performance of the skill occurs with diminishing errors and greater efficiency and flexibility.

**motor learning theory**: Theoretical basis for understanding how the central nervous system learns to control, modify, and regulate the motor system in order to respond and react to the internal and external environment within which that body functions.

**motor planning (praxis)**: The ability to plan and execute skilled nonhabitual tasks.

**motor skill**: The ability to execute coordinated motor actions with proficiency.

**MOVE (motivation/memory, olfaction, visceral [ANS], emotional)**: An acronym representing the functions of the limbic system in cognitive learning and motor control.

**movement decomposition**: Distortion of voluntary movement in which the movement occurs in a distinct sequence of isolated steps, rather than in a normal, smooth, flowing pattern.

**movement deficits**: Functional movement problems that prevents the individual from performing movement in an effortless fashion.

**movement speed**: The time elapsed between the initiation of a movement and its completion.
**movement therapies:** Therapeutic practices and protocols that focus on the individual patient participating in functional movement activities with the help of an assistant when necessary to maintain what would be considered efficient and effective motor control.

**multiple sclerosis:** A chronic disease of the white matter of the central nervous system characterized by inflammation, demyelination, and the development of hardened plaques. The symptoms and signs are numerous; the course is erratic; its etiology appears to be autoimmune.

**muscle activation deficits:** Problems between the motor neuron cell body and contraction of the striated muscle fiber, which prevent the muscle fiber from contracting.

**myelencephalon:** The lower part of the embryonic hindbrain from which the medulla oblongata develops.

**myelin:** A fatlike substance forming the principal component of the sheath of nerve fibers in the CNS.

**myelin basic protein (MBP):** A protein component of myelin which has been the subject of considerable study in MS research. An injection of MBP can induce a demyelinating condition reminiscent of MS in animals called experimental allergic encephalomyelitis (EAE).

**myelination:** The process of forming the “white” lipid covering of nerve cell axons; myelin increases the conduction velocity (speed) of the neuronal impulse; forms the white matter of the brain and spinal cord (as opposed to the gray matter).

**myelodysplasia:** A developmentally anomaly of the spinal cord.

**myelomeningocele:** Spina bifida in which neural tissue of the spinal cord and the investing meninges protrude from the spinal column forming a sac under the skin.

**myelography:** Radiographic inspection of the spinal cord by use of a radiopaque medium injected into the intrathecal space.

**myasthenia gravis:** A disorder of neuromuscular function, thought to be due to the presence of antibodies to acetylcholine receptors at the neuromuscular junction. Clinically, there is fatigue and exhaustion of the muscular system with a tendency to fluctuate in severity and without sensory disturbance or atrophy.

**myofascial release:** Manipulation of the soft tissues of the body for the purpose of interrupting built-in imbalances and restrictions within the fascia and reintegrating the fascial mechanism.

**natural environments:** All integrated community settings.

**neocerebellum:** Those parts of the cerebellum that receive input via the corticopontocerebellar pathway.
**neologism:** A new, meaningless word, often spoken by fluent aphasic clients.

**neonatal neuropathology:** A disease or pathology of the nervous system identified while the child was in utero or once a child is born prematurely.

**neonatal intensive care unit environment (NICU):** A critical care hospital unit where specialized health care practitioners treat and care for premature or very young babies that are in health crisis.

**nerve conduction tests:** Measurement of the electrical conductivity of motor and sensory nerves by application of an external electrical stimulus to the nerve and evaluation of parameters such as nerve conduction time, velocity, amplitude, and shape of the resulting response, as recorded from another site on the nerve or from a muscle supplied by the nerve.

**nerve conduction velocity:** The speed at which an impulse will travel down a neuron.

**neural irritability:** Hypersensitivity of the receptor sites or outer wall of a neuron which causes that neuron to respond at a high rate that expected.

**neural mobility:** The ability of the neuron or nerves to lengthen and shorten as the limb moves and the muscles contract and relax.

**neural sensitization:** Axons that become inflamed, hypoxic, or demyelinated can enter a hyperexcitable state. A nerve in a hyperexcitable state can begin to discharge spontaneously, become mechanosensitive, or develop a sustained rhythmic discharge after stimulation, all of which can result in the production of pathological pain. If the change in sensitivity or threshold allows what were once subthreshold stimuli to evoke pain then suprathreshold stimuli may evoke exaggerated pain.

**neurapraxia:** Interruption of nerve conduction without loss of continuity of the axon.

**neurodevelopmental treatment:** A type of movement therapy that bases its theories on the function of the nervous system, how it learns, and how it normally changes over time.

**neurography:** Study of the action potentials of nerves.

**neurological assessment:** A specific examination tool that focuses on the various functions of the sensory and motor systems controlled and modified by the central nervous system.

**neuromechanism:** A neurological system whose component parts work together to produce central nervous system function.

**neuromodulators:** Chemicals capable of directly affecting pain transmission. The neuromodulators include enkephalin and beta-endorphin, which are referred to as endogenous opiates because they have morphine-like actions.
neuromotor assessment: Examination of motor control system through the use of movement responses.

neuromotor intervention: Treatment desired and delivered by occupational and physical therapists to create an environment that allows the client to learn and control normal functional movement.

neuromuscular electrical stimulation: The use of an electrical impulse for the purpose of examination of the neuromuscular system and intervention when appropriate as biofeedback.

neuronal sprouting: The process of regrowing a neuronal process (e.g., axon) in an injured neuron in an attempt to reestablish innervation with a target structure.

neuropathy: Any disease or dysfunction of the nerves.

neuroplasticity: Anatomical and electrophysiological changes in the central nervous system in response to demands from the internal and external environment.

neuroprosthetics: The use of the existing neural pathways to control and run a specific prosthetic device.

neurotmesis: Damage to the axon and the endoneurial tube with the nerve remaining macroscopically intact, or complete transection of the nerve. Regeneration is less successful than in axonotmesis.

neurotransmitter: A specific chemical agent that is released from presynaptic cells and travels across the synapse to stimulate or inhibit postsynaptic cells, thereby facilitating or inhibiting neural transmission.

neurotrophic: Nutrition and maintenance of tissues as regulated by nervous influence.

neurovascular entrapment: Scarring, swelling, or abnormal tissue growth of connective tissue that traps or compresses both the vascular and nervous system creating dysfunction and pain.

nociceptor: A peripheral nerve ending that appreciates and transmits painful or injurious stimuli.

nonverbal learning disabilities: Learning disabilities in children that affect nonverbal learning strategies such as visual-spatial and perceptual reasoning.

normal movement strategies: Motor programs can be available to the CNS at birth or learned throughout life. The variability of these programs and the amount of practice an individual has had to perform the movements determines the movement strategies available given any environmental context. The range of strategies that are used to perform the motor activity in an effortless, fluid, energy efficient manner is a range of behaviors that are defined as
“normal.” Thus normal movement strategies are a range of behaviors that are considered normal for a person of that age, activity level, and experience.

**nosocomial:** Hospital-acquired.

**nuchal rigidity:** Reflex spasm of the neck extensor muscles resulting in resistance to cervical flexion.

**nystagmus:** A series of automatic, back-and-forth eye movements. Different conditions produce this reflex. A common way of producing them is by an abrupt stop following a series of rotations of the body. The duration and regularity of postrotary nystagmus are some of the indicators of vestibular system efficiency.

**observational learning:** The attainment of accuracy and improvement in the quality of performance of a motor task that is gained via observation of that task or its components.

**occupational-based performance:** Performance that requires the individual to have competence.

**occupational therapy:** The therapeutic use of purposeful and meaningful goal-directed activities (occupations), which engage the individual's body and mind in meaningful, organized, and self-directed actions that maximize independence, prevent or minimize disability, and maintain health.

**ocular dysmetria:** The inability to fix gaze on an object or follow a moving object with accuracy.

**offset feeder:** One of the two most common orthoses used for feeding assistance that allows an individual with a C5 cervical spinal cord injury to independently feed. Refer to Figure 16-23 for a visual image.

**oligoclonal banding:** A process by which cerebrospinal fluid IgG is distributed, following electrophoresis, in discrete bands. Approximately 90% of clients with multiple sclerosis show oligoclonal banding.

**oligodendroglia:** Myelin-producing cells in the CNS.

**operant conditioning:** A cognitive treatment technique in which a voluntary, nonautomatic behavior is paired with a new stimulus through reinforcement or punishment.

**ophthalmoplegia:** Paralysis of ocular muscles.

**opisthotonus:** Position of extreme hyperextension of the vertebral column caused by a tetanic spasm of the extensor musculature.

**optokinetic nystagmus:** Nystagmus induced by watching stripes on a drum revolving around one's face.
**orthostatic hypotension:** A dramatic fall in blood pressure when a patient assumes an upright position, usually caused by a disturbance of vasomotor control decreasing the blood supply returning to the heart.

**orthosis:** An external device utilized to apply forces to a body part to limit movement, increase the velocity or power of a movement, stop movement, or hold the body part in a particular position. Previously called brace or splint.

**orthotic robots:** Robotic components added to an orthotic.

**orthotics:** An external device that assists in the stability and/or mobility of a specific limb or joint.

**otologic (neurotologic):** An impairment of the ear that can activate psychogenic dizziness, which can also be caused by anxiety.

**outpatient services:** Services provided to the patient following discharge from inpatient hospitalization, or services provided to a patient referred to the therapist directly from the physician.

**overwork damage:** Damage to human tissue (neural or muscular) that is caused by the body forcing the system to function beyond its normal capabilities.

**pachymeningitis:** Acute inflammation of the dura mater.

**pain character measurement:** Any of the tools used to define the character of a client’s pain.

**pain drawing:** A way to allow the patient to identify and express the level of pain that he or she perceives.

**pain estimate:** A pain intensity measurement with which clients rate pain on a scale of 0 to 100.

**pain intensity measurement:** Any of the scales used to quantify pain intensity.

**pain intensity rating tools:** Scales that have the client rate the current level of pain by marking a continuum or assigning a numerical value to the pain intensity.

**pain localization tools:** Also referred to as pain measurement tools; designed to provide information about the intensity, location, and character of a client's symptoms at the time of the evaluation. This information can then be merged with the pain history, disease/pathology history, and the physical findings to identify the cause of pain. Body diagram screening symptom location can be used to have the patient identify and the therapist mark where pain is located. Figure 7-6 is an example of such a diagram chart.

**pain mechanisms:** Pain mechanisms include CNS anatomy where the pain is recognized, process and interpreted, the sensory, motor and interneural pain pathways, pain modulation.
**pain modulation:** Variation in the intensity and appreciation of pain secondary to CNS and ANS effects on the nociceptors and along the pain pathways, as well as secondary to external factors such as distraction and suggestion.

**pain pathway:** The route along which nerve impulses arising from painful stimuli are transmitted from the nociceptor to the brain, including transmission within the brain itself.

**papilledema:** Edema of the optic disk.

**paradigm:** An example that serves as a pattern or model for something, especially one that forms the basis of a methodology or theory.

**parallel talk:** A form of speech used during play therapy with children in which the clinician verbalizes actions such as what is happening or what the child is doing without requiring answers from the child. For instance, “I'm making a cake. Mine is good. You're making a cake, too.” The clinician often repeats utterances of the child correctly and parallels the child's activities.

**paranodal myelin intussusception:** The ultrastructural change that occurs at Ranvier node because of acute focal compression of a nerve, resulting in a neuropraxic lesion.

**paraplegia:** The impairment or loss of motor and/or sensory function in the thoracic, lumbar, or sacral (but not cervical) segments of the spinal cord, secondary to damage of neural elements within the spinal canal.

**paraxial:** Lying near the axis of the body.

**parent instruction:** An identified process used to guide and direct the parents in a functional activity or handling skill they will be doing or using with their child.

**paresthesia:** An abnormal spontaneous sensation such as burning, pricking, tickling, or tingling.

**Parkinson disease; parkinsonism:** A degenerative disease of the basal ganglia characterized by slow movements, rigidity, a resting tremor, and postural instability.

**participation:** The involvement in a life situation.

**patient referral:** The act or process of sending a patient to a medical specialist, or a medical specialist sending that patient to a physical or occupational therapist for an evaluation and possible intervention.

**patterned responses:** The programs either preprogrammed or created by the motor system to succeed at the presented task in the most efficient and integrated response possible at that moment in time.
pediatric verbal descriptor scale for pain: A process in which specific words are introduced to a child and the child responds in relation to his/her perceived pain.

pelvic floor dysfunction: Sensory and/or motor functional problems within the smooth and striated muscles of the pelvic floor leading to problems in volitional control of urination and defecation especially during activities such as exercise, sneezing, coughing, and any other activity that places pressure on the pelvic floor musculature.

pendular knee jerk: Upon elicitation of the deep tendon reflex of the knee, the lower leg oscillates briefly like a pendulum after the jerk, instead of returning immediately to resting position.

perceptions: The process of using the senses to acquire information about the surrounding environment or situation; any of the neurological processes of acquiring and mentally interpreting information from the senses.

perceptual-motor: The interaction of the various channels of perception with motor activity, including visual, auditory, tactual, and kinesthetic channels.

perceptual-motor match: The process of comparing and collating the input data received through the motor system and through perception.

peripheral pain: Pain arising from injury to a peripheral structure.

personal simulators: Robots programmed with physiological responses designed to teach health professionals the diagnostic process, procedural treatments and life saving skills.

phantom limb pain: The sensation that an amputated part is still present, often associated with painful paresthesia.

pharmacist: A professional trained and licensed to dispense medicinal drugs and to advise the patient and the doctor on their use.

phenol block: An injection of phenol (hydroxybenzene) into individual nerves; used as a topical anesthetic and produces a selective block of these nerves; sometimes used to control severe spasticity in specific muscle groups.

phonophoresis: The use of ultrasound energy to drive chemical molecules into the tissues for therapeutic purposes.

physical human-robot interaction (pHRI): The generation of supplementary forces to empower and overcome human physical limits, requiring power between the two.

physical therapy: A profession with an established theoretical base and widespread clinical application in the preservation, development, and restoration of optimal physical function. Interventions focus on movement function and dysfunction, which encompass treating
musculoskeletal, cardiopulmonary, integumentary, and neuromuscular problems that affect the individual during life activities such as work, leisure time, or daily living skills.

**physiological and musculoskeletal risks:** Dangers that injury, damage, or loss will occur to any physiological or musculoskeletal system because of the external environment or stressors placed on the patient's body from medical/therapeutic interventions.

**physiological flexion:** The excessive amount of flexor tone that is normally present at birth because of the existing level of CNS maturation and fetal positioning in utero.

**plaque:** A multiple sclerosis lesion characterized by loss of myelin and hardening of tissue.

**plasmapheresis:** A process by which whole blood is removed from the client; plasma is discarded and replaced by normal plasma or human albumin, and reconstituted blood is then returned to the client. In treating multiple sclerosis it is believed that this process rids the blood of antibodies or substances that are damaging to myelin or that impair nerve conduction.

**plasticity:** The ability to change (refer to neuroplasticity when discussing nervous system plasticity).

**pneumoencephalogram:** Radiographic examination of ventricles and subarachnoid spaces of the brain following withdrawal of cerebrospinal fluid and injection of air or gas via lumbar puncture.

**point stimulation:** The stimulation of sensitive areas of skin using electricity, pressure, laser, or ice for the purpose of relieving pain.

**polyradiculoneuropathy:** An inflammatory disorder (such as Guillain-Barré syndrome) that affects peripheral nerves and the nerve roots of the spinal nerves and is marked by demyelination or axon degeneration.

**polyradiculopathy:** Inflammation of multiple nerve roots.

**polysomnography:** Monitoring of physiological activity during sleep.

**position in space:** Direction in which figures point, relationship of one body part to another, or the entire body's relationship to objects or others in space.

**posterior/heel lever arm:** A feature included in the ankle joint of an ankle foot orthosis that produces a posterior force to extend the knee and provide knee stability.

**postpolio syndrome:** A condition that affects patients with prior diagnosis of poliomyelitis long after recovery from the initial acute disease and that is characterized by muscle weakness, joint and muscle pain, and fatigue.
**posttraumatic amnesia:** The time elapsed between a brain injury and the point at which the functions concerned with memory are determined to have been restored.

**postural and movement compensation:** Compensatory movement programs used by or taught to the patient to try to control both the postural and movement motor programs within any functional activity.

**postural background movements:** The subtle, spontaneous body adjustments that make overt movements of the hands easier, for example, reaching for a distant object. These postural adjustments depend on good vestibular and proprioceptive integration.

**postural control:** The ability of an individual to effectively use motor programs designed to stabilize joints during postural activities and to control coactivation of agonist and antagonists during movement at the joint(s).

**postural tremor:** A pathological tremor of 3 to 5 Hz that appears in a limb or the trunk when either is working against the pull of gravity.

**posture:** In the strictest sense, the position of the body or body part in relation to space and/or to other body parts. Functionally, the anticipation of and response to displacement of the body's center of mass.

**pragmatics:** The study of language as it is used in context.

**praxis:** The ability to plan and execute a motor program as a functional activity.

**predictors of recovery:** Signs/symptoms, cognitive processing, or motor control that indicate the return of function.

**prefrontal lobe:** The area of the frontal lobe that is anterior and inferior to the premotor and supplementary motor cortex.

**pressure ulcer:** A slow-healing sore on the surface of the skin that may result in destruction of tissue that was the result of maintained pressure to the skin and lack of circulation/oxygenation to those tissues.

**primary impairments:** The main system or subsystem that is diseased or damaged that is preventing an individual from performing normal functional activities of daily living.

**problem solving:** The process of logically or intuitively overcoming barriers in an individual's environment.

**procedural memory:** The specific motor programs learned and retained to run motor programs or combinations of programs in order to perform functional activities.
prognosis: In the area of movement analysis, it is an opinion regarding the likely course and outcome following an intervention.

prospective payment system (PPS): A payment structure in which acute hospitals were initially paid a set amount per patient. The amount depended on the medical diagnosis and related morbidities. Today the PPS extends beyond acute hospital services to inpatient rehabilitation and skilled nursing facilities, home health agencies, and long-term care hospitals.

prosthetic robots: A wearable electromechanical device that substitutes for lost limbs after an amputation. The robotic part of the prosthesis usually takes the form of electromechanical wearable robotic limbs that can replace lost limb function closer to normal movement.

Proprioceptive: Receptors that respond to stimuli originating primarily from muscle spindles, Golgi tendon organs, and joints.

protopathic: Pertaining to the somatic sensations of fast, localized pain; slow, poorly localized pain; and temperature.

psychoneuroimmunology: A field of medicine that deals with the influence of emotional states (as stress) and nervous system activity on immune function especially in relation to their effect on the onset and progression of disease.

pulmonary embolism: An obstruction of the pulmonary artery or one of its branches usually caused by an embolus from a lower extremity thrombosis.

Purkinje cells: Large neurons found in the cerebellar cortex that provide the only output from the cerebellar cortex after the cortex processes sensory and motor signals from the rest of the nervous system.

quadriplegia (tetraplegia): Term used to describe paralysis in all four extremities; often used when describing the movement dysfunction in individuals following cervical neck spinal cord injury.

radiation therapy: The treatment of disease using radiation x-rays or beta rays directed at the body from an external source or emitted by radioactive materials placed within the body.

reaction of degeneration: The condition in which a short-duration electrical stimulus (usually less than 1 ms) applied to a motor nerve results in a sluggish or absent muscle response, rather than the normally brisk contraction. The reaction may be partial or complete, depending on the extent of neuropathology. This electrophysiological reaction can be used as a screening assessment of peripheral nerve integrity.

reasonable and necessary: Words used to define a billing standard based on averages determined from local coverage standards. These standards along with ICD-9-CM codes are used to establish fees for services within various geographic areas and service environments.
**radiograph:** An image produced on a sensitive surface by a form of radiation (x-rays); also called plain films.

**rebound phenomenon:** The inability to stop a resisted muscle contraction, such that movement of the limb occurs when the resistance is unexpectedly withdrawn from the limb.

**reciprocating gait orthosis:** An orthotic device that reciprocally moves one leg forward while stabilizing the weight bearing limb to propel the legs forward in an upright gait pattern.

**recoordination of the functions of the abdominal compartment:** The ability of the abdominal compartment and pelvic girdle to function in harmony. The abdominal compartment plays an integral role in the normal functioning of the pelvic girdle. Recoordination of the function between the abdominal compartment and the pelvic girdle is an important element of pelvic girdle sensory and motor training. For example, when a person sneezes, the abdominal contraction is strong and must work in coordination with the pelvic girdle to simultaneously cause pelvic girdle contraction. Given this example, without this coordination the force from the abdominal system may cause a strong force on the bladder and release of urine, a situation termed incontinence.

**red nucleus:** The large, vascular nucleus found in mesencephalon, involved in transmission of cerebellar communications to the motor cortex and thalamus.

**reflux:** The backflow of urine from bladder to ureters.

**refractive error:** Nearsightedness (myopia), farsightedness (hyperopia), astigmatism, or presbyopia. All conditions are improved with corrective lenses.

**rehabilitation:** The restoration of a disabled individual to maximum independence commensurate with his or her limitations.

**rehabilitation robotics (RR):** A class of robots that can be integrated into rehabilitation programs to enhance independence and extend function; originated from work on powered orthotics at CASE Institute of Technology in the 1960s

**relaxation techniques:** A cognitive treatment technique that addresses muscle tension accompanying pain.

**remission:** A lessening of the symptoms of a disease or their temporary reduction or disappearance of the functional limitations.

**research:** Methodical investigation into a subject to discover facts, to establish or revise a theory, or to develop a plan of action based on the facts discovered. Depending on the research design, the results can lead to effectiveness of treatment or efficacy of a specific variable in relation to change following a course of intervention. Both effectiveness and efficacy lead to evidence-based practice through research.
**response speed:** The time elapsed between presentation of a stimulus and the client’s initiation of movement.

**retardation:** A person who has had some degree of mental impairment all his or her life. A retarded person can also develop delirium or dementia. Delirium or dementia differs from retardation in that there has been a change from what was normal for that person.

**retrograde amnesia:** The inability to recall events that have occurred during the period immediately preceding a brain injury.

**reverberating loops or circuits:** A process by which closed chains of neurons when excited by a single impulse will continue to discharge impulses from collateral neurons back onto the original neuronal pool. The end result may produce a higher level of excitation than the original input itself.

**review of systems screening:** A screening process that systematically goes through each bodily system to eliminate or identify potential signs and symptoms that would alert the examiner to potential system problems.

**rhizotomy:** A neurosurgical intervention at the level of the cauda equina, or lower level of the spine, to interrupt abnormal sensory feedback that appears to maintain hypertonus. The procedure was developed in 1908 and has been modified by a series of neurosurgeons, with the objective of reducing hypertonus associated with CNS dysfunction to allow the expression of functional postural control.

**rigidity:** Resistance to passive range of motion that is not velocity-dependent and affects the muscles on both sides of the joint.

**robots:** Smart, computerized devices that can interact with a human actor to perform a task; a reprogrammable, multifunctional manipulator designed to move materials, parts, tools, or specialized devices through variable programmed motions for the performance of a variety of tasks.

**robot mediated therapy:** The use of robotics to provide movement therapy for the rehabilitation of patients with impairments; may be unilateral or bilateral; robots may be passive (movement imposed while patient relaxed), active assisted (patient initiates the movement but robot assists in a defined path); or active resisted (patient moves against resistance generated by the robot).

**rooting reflex:** Anormal reflex in infants up to 4 months of age where the infant’s head turns in the direction of the stimulus when the cheek is stroked gently.

**saccadic eye movement:** An extremely fast movement of the eyes, allowing the eyes to accurately fix on a still object in the visual field.

**saccadic fixations:** A rapid change of fixation from one point in a visual field to another.
sacral agenesis: An incomplete development or total absence of the sacral aspect of the pelvis.

scanning speech: An abnormal pattern of speech characterized by regularly recurring pauses.

scoliosis: Lateral curvature of the spine; this may consist of two curves, the original abnormal curve and a compensatory curve in the opposite direction.

secondary impairments: System problems that either have developed from the primary impairments or have developed along with the primary problems and may create further dysfunction if ignored.

sensorimotor therapy: Therapy planned to enhance the integration of motor learning and the emergence of voluntary motor behaviors concerned with posture and movement.

sensory conflict: Situations in which sensory signals that are expected to match ("agree") do NOT match, either between systems (vision, somatosensory, or vestibular) or within a system (two proprioceptive inputs such as the joint and the muscle).

sensory deprivation: An enforced absence of the usual repertoire of sensory stimuli. The continued decrease or absence of adequate, normal stimuli can produce severe cognitive, motor, and emotional changes, including hallucinations, anxiety, depression, neglect of an extremity or body part, and inadequate motor response to the environment.

sensory environment: The sensory conditions that exist in the real world around us that affect balance (e.g., darkness, visual movement, compliant surfaces).

sensory integration: The organization of sensory input for use, a perception of the body or environment, an adaptive response, a learning process, or the development of some neural function.

sensory integrative dysfunction: A disorder or irregularity in brain function that makes sensory integration difficult. Many, but not all, learning disorders stem from sensory integrative dysfunctions.

sensory integrative therapy: Therapy involving sensory stimulation and adaptive responses to it according to a child's neurological needs. Treatment usually involves full body movements that provide vestibular, proprioceptive, and tactile stimulation. It usually does not include desk activities, speech training, reading lessons, or training in specific perceptual or motor skills. The goal is to improve the brain's ability to process and organize sensations.

sensors: Devices on computerized exoskeletons that are sensitive to different inputs for control such as vision, hearing, touch, or pressure.

sensuality: Responding to sensory input in a positive manner, resulting in the person deriving bodily or sensory pleasure.
**septicemia:** Systemic disease associated with the presence and persistence of pathogenic microorganisms or toxins in the blood.

**serial speech:** Overlearned speech involving a series of words such as counting and reciting the days of the week.

**service robotics:** A group of robotic devices that provide a service to a human.

**sexuality:** The behaviors that relate psychological, cultural, emotional, and physical responses to the need to reproduce.

**shoulder pain:** Pain that is located with the axial aspect of the upper thorax or proximal upper limb.

**shoulder subluxation:** A partial dislocation of the humerus from the shoulder joint that leaves them misaligned but still in some contact with each other.

**significant impairments:** Impairments that have a major or important effect on functional activities.

**simple descriptive pain scale (SDPS):** A client rating scale for pain that is on a continuum; it is subdivided using descriptors that gradually increase in intensity. Sample descriptors are “no pain,” “mild pain,” “moderate pain,” “severe pain,” and “maximum pain tolerable.”

**slow pain:** The second sensation perceived after injury; it is poorly localized and outlasts the duration of the stimulus.

**skilled services:** Services that require special abilities developed and practiced over time.

**smooth pursuit movement of the eyes:** An ocular response characterized by the eyes moving together at a steady velocity, not in saccades, when following a slowly moving object.

**soft neurological signs:** Mild or slight neurological abnormalities that are difficult to detect.

**software programs:** Simple and complicated applications designed for the computer to control robots, generate games, track performance, and provide feedback.

**somatosensory retraining:** An intervention strategy used to retrain the somatosensory association areas in order to remap the sensory component of functional activities; used most often following repetitive strain injuries which result in distal focal dystonia.

**spastic diplegia:** An increase in postural tonus that is distributed primarily in the lower extremities and the pelvic area.
**spastic quadriplegia:** An increase in postural tonus that is distributed throughout all four extremities. These findings are often coexistent with relatively lower tone in the trunk and severe difficulty in controlling posture.

**spasticity:** A motor disorder characterized by a velocity-dependent increase in tonic stretch reflexes with exaggerated tendon jerks, resulting from hyperexcitability of the stretch reflex. Spasticity is one component of the upper motor neuron syndrome.

**speech:** The meaningful production and sequencing of sounds by the speech sensorimotor system (e.g., lips, tongue) for the transmission of spoken language.

**speech pathology:** Speech/language pathology, speech therapy, or communicative disorders: terms used to specifically identify the professional scope of practice that focuses upon communication as a receptive, interactive, and expressive function of humans. This profession deals with the cognitive, emotional, and motor impairments that deal with human language and communication.

**spina bifida cystica:** A fault in the spine where the bones of the back fail to form properly, leaving a gap. That gap can allow spinal fluid to fill in a sac that forms a cyst.

**spina bifida occulta:** A mild often asymptomatic form of spina bifida in which there is no hernial protrusion in the meninges or spinal cord. There is a bone defect but no nerve damage.

**spinal cord injury (SCI):** An insult to the spinal cord that results in neurological deficits.

**spirituality:** The aspect of human thought and communication that focuses on the belief that man has more than a physical body and that aspect does or may join a universal energy that has a higher power source than any one individual. This may or may not have a direct connection with formal religion.

**spirometry (pneumatometry):** The measurement of inspired and expired air.

**stages of motor development:** A series of progressive stages of motor learning that provides the foundation for movement development. It is often based on behavioral responses of children who are consider to be progressing, maturing and demonstrating motor skill appropriate for children of that chronological age.

**standardized evaluations of function:** A test of movement function administered according to standardized procedures and compared with an acceptable standard of functional responses.

**standing A-frame:** One of the first orthotic devices used with children with spina bifida. It is a relatively inexpensive tubular frame to which adjustable parts are attached. This standing device offers support of the trunk, hips, and knees and leaves the hands free for other activities. Refer to Figure 18-16 for a visual image.
**static equilibrium:** The ability of an individual to adjust to displacements of his or her center of gravity while maintaining a constant base of support.

**stereognosis:** The ability to recognize the sizes, shapes, and weights of familiar objects without the use of vision.

**stereopsis:** the quality of visual fusion.

**strabismus:** The oculomotor misalignment of one eye.

**subspecialty training:** A very narrow or specialized field of study within an existing specialty.

**strategies:** A carefully devised plan of action to achieve a goal or the art of developing or carrying out such a plan.

**sudomotor:** Denoting the nerves that stimulate the sweat glands.

**support systems:** Specific groups, family members, or friends who provide emotional, spiritual, and physical help for the patient.

**synaptogenesis:** The process of forming synaptic connections between nerve cells, or between nerve cells and muscle fibers; the basis of neuronal communication.

**synergy:** A fixed set of muscles contracting with a present sequence and time of contraction.

**systems interactions:** The ways the various CNS systems affect or interact with one another to provide a more integrative and functional nervous system.

**systems model:** A conceptual representation that incorporates a set of major functional divisions or systems within the CNS which interlock and interrelate to create the functional whole. Although each division may be considered a whole in and of itself with multiple subsystems interlocking to form its entire division, each major component or division influences and is influenced by all others and thus the totality of the CNS is based on the summation of the interactions, not individual function.

**systems model/approach:** An interactive framework for understanding movement and postural control which includes (1) environmental stimuli; (2) sensory reception, perception, and organization; and (3) motor planning, execution, and modification.

**systems theory:** A theory describing movements emerging as a result of an interaction among many peripheral and central nervous system components with influence changing depending on the task.

**tactile defensiveness:** A sensory integrative dysfunction characterized by tactile sensations that cause excessive emotional reactions, hyperactivity, or other behavior problems.
**T cells:** A subgroup of lymphocytes with two subpopulations CD8 and CD4+. CD4+ T cells are the middlemen of the immune response and the target of the virus leading to HIV infection.

**telecare:** The instance where health or care services are provided to people in their homes or other supervised living settings.

**telemedicine:** The transfer or exchange of medical and healthcare information using Information and Communication Technologies (ICT).

**telereceptive:** The exteroceptors of hearing, sight, and smell that are sensitive to distant stimuli.

**tenodesis:** The operation of suturing the end of a tendon to a bone, or the pattern of wrist extension with tight wrist flexors which causes the hand to close.

**tenotomy:** Surgical section of a tendon used in some cases to treat severe spasticity and contractures.

**tethered spinal cord syndrome:** A disorder characterized by progressive neurological deterioration that results from compression of the lowermost bundle of nerves of the spinal cord (cauda equina). It is most commonly associated with a defective closing the neural tube during embryonic development.

**tetraplegia:** Impairment or loss of motor and/or sensory function in the cervical segments of the spinal cord due to damage of neural elements within the spinal canal.

**thalamic pain:** CNS pain caused by injury to the thalamus and characterized by contralateral and sometimes migratory pain brought on by peripheral stimulation.

**therapeutic environment:** Organizing all aspects of the environment in a systematic way so that they enhance a patient’s ability to perform desired tasks and activities (mental, emotional, functional).

**therapeutic exercise:** Physical exercises or activities specifically designed or prescribed by a health care professional with the goal of remediating a loss of function or specific impairment in motion, strength, coordination, or control where said problem was the result of disease, disorder, or injury.

**therapeutic interventions:** Specific interventions that are designed by occupational and physical therapists whose outcome should have a therapeutic value and assist the patient in regaining functional control or compensating for loss of function in activities of daily living.

**therapeutic touch:** The exchange of energy from one person to another for the purpose of healing.
thermotherapy: The use of heat or cold for therapeutic purposes.

third-party payer: The organization or health care service payer that provides payment for services provided by physical and occupational therapy. This payer is an entity that was not present and did not receive the therapeutic intervention.

thrombophlebitis: The inflammation of a vein associated with thrombus formation.

thyrotropin-releasing hormone: A hormone from the hypothalamus that stimulates the anterior lobe of the pituitary gland to release thyrotropin.

tongue-thrust swallow: An immature form of swallowing in which the tongue is projected forward instead of retracted during swallowing.

topognosis: The ability to localize tactile stimuli.

total lymphoid irradiation (TLI): Radiation therapy targeted to the body's lymph nodes; in the treatment of multiple sclerosis, the goal is to suppress immune system functioning (reduce the number of lymphocytes in the blood).

transcutaneous nerve stimulation (TNS): A procedure in which electrodes are placed on the surface of the skin over specific nerves and electrical stimulation is carried out. Stimulation of the CNS in this manner is thought to improve CNS function, reduce spasticity, and control pain.

traumatic head injury: An insult to the brain caused by an external physical force that may produce a diminished or altered state of consciousness resulting in impairment of cognitive abilities, emotional control, or functioning.

treatment: The application of or involvement in activities/stimulation to affect improvement in abilities for self-directed activities, self-care, or maintenance of the home.

treatment strategies: Therapeutic approaches used during neurological rehabilitation that incorporate impairment training, functional training, hands-on interventions, somatosensory retraining, and compensatory training, which are based on the internal potential, external environment, and specific goals of the client.

trophotropic: The combination of parasympathetic nervous system activity, somatic muscle relaxation, and cortical beta rhythm synchronization; resting or sleep state.

truncal ataxia: The uncoordinated movement of the trunk.

trunk/arm-linked movements: Movements that are synergistically tied as motor programs that link arm and trunk movements during a functional activity.
**trunk control:** The control of proximal muscles of the spine and trunk that stabilize the trunk when the body is responding to gravity either in quiet balance patterns or during a movement or position change in space.

**trunk/leg-linked movements:** Movements that are synergistically tied as motor programs that link leg and trunk movements during a functional activity.

**undesirable compensations:** Movement or behavior responses that exaggerate or increase the deficit or functional limitation.

**universal cuff:** An adaptive device worn on the hand to hold items such as utensils, shaving razor, or pencil, allowing an individual with weak grasp to participate in self-care activities.

**upper motor neuron:** A neuron that is located within the central nervous system; its function is to relay information from one part to the other or to modulate control within nuclear bodies.

**ventriculostomy:** A surgical establishment of an opening in a ventricle of the brain to drain cerebrospinal fluid, especially in hydrocephalus.

**verbal rating scale:** A pain intensity measurement in which clients rate pain on a continuum that is subdivided from left to right into gradually increasing pain intensities.

**vergence:** The movement of the eyes in the opposite direction.

**vermis:** The unpaired medial region of the cerebellum.

**version:** The movement of the eyes in the same direction.

**vestibular-bilateral disorder:** A sensory integrative dysfunction characterized by short-duration nystagmus, poor integration of the two sides of the body and brain, and difficulty in learning to read or compute. The disorder is caused by underreactive vestibular responses.

**vestibulo-ocular reflex:** A normal reflex in which eye position compensates for movement of the head, induced by excitation of vestibular apparatus.

**virtual reality training:** Computerized modification of physical conditions simulate real life environmental conditions; systems using conditions, subjects or games that appear only as images (usually on a computer screen) to increase confidence, balance and/or physical performance skills.

**visual analog scale (VAS):** A pain scale that the patient marks on a continuum that begins with “no pain” and ends with “maximum pain tolerable.” This tool provides an infinite number of points between the extremes, making it sensitive to small changes in pain intensity.
**visual analytical problem solving:** The ability to look at a complex array of visual stimuli, identify the critical attributes, and then use appropriate strategies to solve simple to complex problems.

**visual-motor coordination:** The ability to coordinate vision with the movements of the body or parts of the body.

**visual-motor function:** The ability to draw or copy forms or to perform constructive tasks.

**visual-perceptual dysfunction:** May include deficits in any of the areas of visual perception: figure-ground, form constancy, or size discrimination; distinct from deficits in functional visual skills and tested separately.

**vision screening:** Can include distance and near visual acuities, oculomotilities, eye alignment or posture, depth perception, and visual fields.

**vocational robots:** Robots that perform difficult or repetitive work tasks to minimize risks of injury to human subjects; initial use of assistive robots with humans was in the vocational environment.

**volitional postural movements or control:** Movement patterns under volitional control that relate specifically to controlling the center of gravity, as in skating, ballet, gymnastics, etc.

**wearable robots (WRs):** A robotic device that can be worn to extend, complement, substitute, or enhance human function and capability; empowers or replaces the human limb on which it is worn with distinctive intrinsic dual cognitive and physical interactions with humans.

**Wallerian degeneration:** The physical and biochemical changes that occur in a nerve because of the loss of axonal continuity following trauma.

**wholistic:** A model or approach to health care that takes into account all internal and external influences during the process. It incorporates the mind, the body, and the spirit as a total or whole.

**wireless:** The ability to send messages to and from a control unit over a network without attached wires.

**zero-to-three infant stimulation groups:** Groups that provide therapeutic services for children from birth to 3 years of age because this age group is not yet eligible for public school placement.