A Heritage of Activity: Development of Theory

(occupational therapy practice, frame of reference, neurobehavioral treatment, research)

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To achieve a professional level of competence, an occupational therapist must be able to translate a body of knowledge into a plan of action that facilitates change in a predicted direction. Clinical practice is grounded on a theoretical base. The aim of this presentation is to increase understanding of theory and the ways it can be linked to practice. To accomplish this task, theory is initially viewed from a broad perspective before attention is focused on its specific relation to intervention.

The discussion first examines the structure and function of theory, its development and verification, and the nature of a profession's theoretical foundation. Next, two common methods for relating theoretical systems to clinical application are presented—practice theory and frame of reference. To illustrate this link between theory and practice, neurobehavioral treatment approaches are analyzed as frames of reference within occupational therapy. Last, the connection of research to theory and practice is described with an emphasis on interpretation of research findings.

Theory: Nature, Development, and Verification

The term theory evolves from the Greek word "theoria," signifying a "vision" or "a look at." The most basic definition of theory comes from the philosophy of science in which theory is considered a set of sentences whose purpose is to explain (1). Theory offers a systematic method for organizing and thinking about data. It provides a coherent view of phenomena by specifying relationships among concepts in order to describe, explain, and predict the phenomena (2).

A theory comprises well-defined concepts and the propositions that relate the concepts to each other (3, 4). Concepts are words or phrases that classify seemingly disparate phenomena according to common characteristics. They are symbolic ways of describing objects, properties, events, and relations among them, and are expressed at varying levels of abstraction and complexity. The concepts pertinent to occupational therapy range from concrete ones such as joint range and muscle strength to more abstract ones such as health, adaptation, and temperament.

Concepts are the basic units of a theory and delineate its subject matter. Precise definitions are essential for understanding since many concepts depend on what can only be indirectly observed or are defined in terms of their relationship to other concepts. Concepts such as intelli-
gence, social roles, and pain are considered constructs because they are inferred from other concepts and are not directly observable. In the development of theory, concepts should be mutually exclusive, discriminating, parsimonious, appropriately abstract, and eventually operational (1, 5).

Propositions, the other structural component of a theory, are statements of a relationship between two or more concepts. Propositions can describe different types of relationships (6); for example, a causal proposition indicates an invariant stimulus-response link between two concepts. More common in the behavioral sciences is the correlational proposition that designates the degree to which events or objects are associated with each other. A temporal proposition states the sequence of events in time. Like concepts, propositions can be expressed in degrees of abstraction. Propositions are theoretical statements also identified in the literature as postulates, suppositions, assumptions, or premises.

A mass of isolated facts and propositions do not constitute a theory. Zetterberg (7) cites more than 1,000 propositions documented as research findings on human behavior. He emphasizes that only when empirical data are systematically arranged and interrelated within a theoretical system can they be interpreted and unified. In general, theories in the physical and biological sciences are more capable of explaining and predicting phenomena than theories in the younger social science disciplines and applied professional fields (8).

Verification of theory is achieved through scientific research (9). Concepts and their connecting statements are reduced to operational definitions stated in measurable, observable terms. In this redefining process concepts become variables, and propositions become hypotheses that can be tested. A theory is validated indirectly by accepting or rejecting hypotheses derived from the theory's propositions.

Accurate prediction of events is the major criterion for judging the relative merit of a theory (10). A particular theory is favored when its predictive power is greater than other theories describing the same phenomena. Theories, therefore, are considered tentative and provisional. The history of science is in large part a chronicle of the refutation of established theories: for example, the basic elements of the universe were once considered earth, fire, air, and water. This premise was later replaced by the theory of the atom as the smallest irreducible element with its electron, neutron, and proton composition. Beyond this level, a whole new universe of even smaller subatomic particles is now being exposed.

Theory and research are the cornerstones of scientific inquiry leading to the acquisition of knowledge. These activities necessitate use of both deductive and inductive reasoning. Reynolds (11) terms the deductive method as the "theory-then-research" approach. Through deduction, theory can be developed by a process of logical thinking before empirical investigation. In the inductive process, specifics of empirical situations lead to generalizations about the data that are interrelated to become theory. There is no best approach to building and evaluating theory. In reality these modes of theory construction are complementary, and both methods contain parts of the other (12).

The scope of a theory may range along a continuum of generality from concern for all the empirical events of a phenomenon or science to an isolated occurrence in the real world. A theory that addresses the entire field under consideration is described by Mills (13) as a "grand theory." These theories, which are global in nature and tend to be very abstract, have been criticized as explaining everything while explaining nothing (14). A collection of all-inclusive concepts and propositions is offered with often limited direct relevance. In contrast, a theory may deal with a specific event in the present with no attempt to generalize beyond. Mills terms this restricted theoretical scope "abstracted empiricism." For example, a theory with little capacity for generalization could conceivably be constructed about a clinical problem of a given client.

McCone (15) proposes the development of middle-range theories that avoid the extremes of both grand theory and abstracted empiricism. This range of theory is characterized as an intermediate level of generality and its ability to be tested. Theories of middle range focus on a selected aspect of reality and a limited number of concepts and propositions. This level of theory building seems particularly suitable for occupational therapy. No profession or academic discipline has successfully developed a grand theory that addresses its entire domain of concern (8). As an illustration, the field of psychiatry experienced a period of stagnation during the 1950s when it adopted psychoanalysis as its grand theory and consequently lost relevance to many patient populations. Occupational therapy needs to generate varying middle-range theories related to its interests in the nature of human occupation and the use of activities to achieve functional well being.
The theoretical systems that comprise the body of knowledge of occupational therapy are generated within the profession as well as drawn from the academic disciplines (e.g., the social and biological sciences) and other professional fields (e.g., medicine). Theories are selected, formulated, and adapted to have specific meaning to the profession's practice. So constituted, they form the body of knowledge or theoretical foundation of the profession. The body of knowledge is unique in its entirety but not in its component parts (16). The challenge to occupational therapy is to identify a body of knowledge that reflects its scientific base and philosophical assumptions in order to organize this knowledge in ways that serve clinical practice.

From a sociological perspective, all professions have a model that delineates their internal structure and content (17). Mosey (18) proposes that this model include the philosophical assumptions of the profession, its ethical code, theoretical foundation, domain of concern, legitimate tools for practice, and principles for identifying and solving client-related problems. In this context a model provides identity and unity to the profession and describes its relationship to other professions and society. Although the theoretical foundation forms an essential component of a profession's model, it is not the sole criterion for defining the profession's service or parameters.

The discussion so far has focused on the structure, development, and verification of theory as well as the nature of a profession's theoretical foundation. In theory building, concepts are formulated and defined, relationships between concepts are expressed as propositions, and hypotheses are tested for validation. Theories are refined or refuted depending on their degree of congruence with observed events. The theoretical foundation of a profession is in a state of continual alteration as knowledge expands through scientific investigation within and outside of the profession (9). The next issue to be explored is the means for relating theoretical systems to clinical application.

**Relation of Theory to Practice**

Traditionally, the function of theory is to explain, describe, and predict phenomena. Control of events is not a primary aim of scientific knowledge, although it may be a desirable outcome (1). For example, theories of motor organization describe the integrative processes of the neuromuscular system but do not address concrete methods of improving coordination. Any training procedures derived from theories are examples of their application and not the function of the theories per se.

In the applied professional fields one is concerned with the nature of the change process and the means to influence it. Two approaches are commonly used to relate theoretical systems to intervention—practice theories and frames of reference. They are two systematic ways of organizing and applying knowledge to effect change. Both models are similar since they share a common goal and use components of a theory. Practice theories and frames of reference serve as linking structures between theory and practice.

A practice theory provides a guide for specific actions to be taken to produce a desired change (19-22). Practice theories represent a departure from the standard view of theory since they offer ways of controlling phenomena. A practice theory uses concepts and propositions to develop a rationale for a coherent approach to assessment and intervention. From this rationale are derived principles that govern the treatment process.

A practice theory addresses the following issues (19-21):

1. **Ideal state of the human organism (health or function),**
2. **Factors adversely influencing the attainment of this state (ill health or dysfunction),**
3. **Kind and extent of behavioral change deemed possible,**
4. **Predicted rate and duration of change,**
5. **Mechanisms or techniques for effecting change, and**
6. **Identification and role of change agents.**

To focus the discussion, the remainder of this paper explores the model of a frame of reference as an approach for linking theory to practice. Frames of reference are produced from the body of knowledge of the profession and address a specific aspect of the profession's domain of concern. A frame of reference is a "set of interrelated internally consistent concepts, definitions, and postulates derived from or compatible with empirical data that provide a systematic description of or prescription for particular designs of the environment for the purpose of facilitating evaluation and change." (Mosey, personal communication, 1982)

A frame of reference is concerned with a specific practice area. It may address one or more performance components (e.g., sensory integration, motor skill, cognition) or an aspect of occupational performance (e.g., activities of daily living, leisure, work). Similar to a practice theory, it describes the change process and provides principles for assisting a client to move from a level of dysfunction to a level of...
function. It is prescriptive in nature. A practitioner may draw on several frames of reference at one time when interacting with a client: in a therapy session with a developmentally disabled child, one may simultaneously employ frames of reference from neurodevelopmental treatment, Piaget, and learning theory. Or the frames of reference may be used sequentially over time as the focus of intervention changes with a client.

According to Mosey (18, 23), a frame of reference has four components: 1. a statement of the theoretical base, 2. delineation of function-dysfunction continua, 3. a listing of behaviors indicative of function and dysfunction, and 4. postulates regarding change.

The theoretical base of a frame of reference contains the structural elements of a theory—that is, well-defined concepts and propositions deduced from one theory or from a number of compatible theoretical systems. The theoretical base establishes the boundaries of the frame of reference by describing the nature of one or more human functions, the influence of the human and non-human environment upon that function, and interactions that facilitate more competent performance in the particular area of concern.

From this base one can derive continua that grade skills from the level of total deficiency to complete mastery in addition to the observable behaviors indicative of adequate or inadequate performance in each continuum. The postulates regarding change identify the type of environmental interactions that effect change in the direction of function. They are prescriptive statements that guide the selection of short- and long-term goals and govern the design of appropriate activities for intervention.

The link between theory and practice is now further examined using neurobehavioral treatment approaches as an illustration of frames of reference. Since these approaches have many commonalities, the discussion addresses them collectively. This section includes a description of their focus and use, an analysis of the theories upon which they are based, an examination of their status as frames of reference within the profession, and last, a personal account of ways to make them more relevant to occupational therapy.

**Neurobehavioral Frames of Reference**

Over the past 30 years Brunnstrom, Bobath, Knott, Voss, Rood, and their associates have evolved systems of intervention that have successively been referred to as neuromuscular facilitation and inhibition, neurophysiological approaches, sensorimotor treatment, neurodevelopmental therapy, and more recently, neurobehavioral approaches. Neufeld (24) suggests use of the last term since the ultimate focus in intervention is on human behavior and not simply on developmental or physiological processes.

The neurobehavioral approaches are primarily concerned with motor performance. The other performance components of sensory integration, cognition, and psychosocial skills are related to the neurobehavioral frames of reference but are not their focus. In the neurodevelopmental treatment approach of Bobath, function or health is viewed as an intact postural reflex mechanism that provides normal muscle tone, reciprocal innervation of opposing muscle groups, and automatic movement patterns such as righting and equilibrium reactions (25). Dysfunction or ill-health is considered a derangement in the postural reflex mechanism caused by lesions in the central nervous system. Inadequate control by higher neurological centers results in abnormal postural tone and the release of tonic reflex activity.

In the proprioceptive neuromuscular facilitation approach advocated by Knott and Voss, health is viewed as a normal neuromuscular mechanism "capable of a wide range of motor activities within the limits of the anatomic structure, the developmental level, and inherent and previously learned neuromuscular responses." (26, p 4) Dysfunction or ill-health is considered a deficient neuromuscular mechanism that results in limitations of movement as evidenced by weakness, incoordination, and spasticity.

Neurobehavioral treatment within the context of occupational therapy can be employed in four primary modes: 1. direct therapeutic handling as preparation for functional performance, 2. the use of treatment procedure while teaching a specific life skill, 3. the provision of selected activities that elicit neurophysiological mechanisms to facilitate psychomotor competence, and 4. the use of adapted positioning and equipment. Neurobehavioral frames of reference are used for restorative purposes as well as to compensate for lost or impaired abilities.

The theoretical base of neurobehavioral treatment draws on numerous theories from neuroanatomy, neurophysiology, kinesiology, and the psychology of learning and development. The theories range on a continuum from the microscopic level such as concepts of neurotransmission and the law of reciprocal innervation to the macroscopic...
level of theories of motor learning and motivation. The strength of the neurobehavioral approaches is the breadth of their knowledge base within the biological, social, and medical sciences.

However, many theories within these fields are at an early stage of development. There is much controversy over such fundamental issues as the nature of motor control and recovery of function after brain damage. Frequently, definitions for neurobiological concepts are not mutually exclusive, discriminating, and readily reducible to operational terms for testing. For example, confusion exists regarding definitions for such concepts as mobility/stability, normal muscle tone, and spasticity. Propositions do not link together all the concepts within each theory in a coherent manner. Instead, the concepts are often haphazardly related, and at times the theories are a mere collection of isolated facts and propositions. All of these limitations in theory development in the neurosciences influence the clarity of neurobehavioral frames of reference that rely upon them for their scientific rationale.

The propositions in these theories are frequently correlational in nature; however, they are commonly viewed as causal propositions when integrated into the theoretical base of neurobehavioral frames of reference. The therapeutic approaches typically explain the effectiveness of specific treatment techniques on neurophysiological principles. Yet few controlled experiments relate mechanisms. For example, the PNF technique of “reversal of antagonists” is founded on the neural concept of successive induction. Its effectiveness, however, could also be explained in reference to the client’s increased motivation and interest when interacting with the therapist.

With Mosey’s criteria for a frame of reference, continued attention is required to refine and organize neurobehavioral treatment approaches into a more cohesive structure. Function-dysfunction continuums and behaviors indicative of function and dysfunction are not well delineated in many neurobehavioral approaches. Consequently, some confusion exists relative to identifying specific continua (i.e., what one treats) and behaviors indicative of dysfunction (i.e., the signs of a problem that will disappear as the problem resolves). General treatment principles are usually stated but are not expressed in the form of postulates for change. For instance, what does it really mean when one says that activities foster integration on a subcortical level?

Of primary importance is the degree to which neurobehavioral frames of reference are adapted to occupational therapy practice to be congruent with the profession’s philosophical assumptions. Neurobehavioral approaches are legitimately concerned with one performance component. However, in normal development and the acquisition of skill, motor control is achieved through involvement in occupational performance—that is, tasks of daily living, play, leisure, and work. Therefore, these frames of reference should explicitly address the role of the individual in influencing his or her own state of health through engagement in goal-directed activities or occupation.

In our profession, movement is not an end product that defines health. Motor performance is viewed as one contributing component to satisfactory accomplishment of life tasks and roles. It is the purposeful application of movement within an environmental context that is important. Movement is only relevant in a field of action (27).

Function or health “is manifested in the ability of the individual to participate in socioculturally delineated and prescribed activities with satisfaction and comfort... As beacons of health, activities are the ends to which occupational therapy directs its energies” (27, p 33) Since activities also have therapeutic potential when applied in a systematic manner, they serve as the means to achieve those ends. The terms activities and occupation have this process-product ambiguity in that they refer both to a sequence of actions (process) and to an outcome (product).

Neurobehavioral frames of reference must reflect occupational therapy’s heritage of activity and view of the individual as an active agent engaged in life tasks. They may be employed concurrently in clinical practice with frames of reference that address other performance components and occupational behaviors. Two positive trends are noted within the profession: 1. there is greater attention to the functional application of these neurobehavioral approaches in the context of the client’s daily life, and 2. commonalities among the approaches are being synthesized as a basis for evolving new, better integrated frames of reference (28-31).

A personal account regarding strategies for relating neurobehavioral treatment to occupational therapy is relevant to this discussion. A few years ago the author shared with colleagues a concern that our clinic had lost its appreciation for activities-based therapy. Intervention was too frequently artificial and unreal, such as stack-
ing cones in PNF patterns and cutting Theraplast with a rocker knife. Simulated activities are only therapeutic if they are familiar, promote positive associations, and resemble as closely as possible the activities pattern the individual will experience in the community.

For a week the activities patterns of our professional practice with neurologically impaired clients were documented. It was a simple procedure of recording on a time chart goals of treatment during the sessions and the means for achieving the goals. The results of this analysis indicated that therapy was splintered into discrete segments with a large percentage of time devoted to direct handling procedures, teaching self-care skills, and repetitive table-top activities presented as perceptual training.

In our occupational therapy clinic the ends had become independence in self-care tasks and achievement of perceptual-motor skills. The means were primarily therapeutic handling procedures and repetitive exercises. To broaden our perspective of activities as the process and product of intervention, numerous strategies were initiated.

We first reviewed and discussed the professional literature describing the nature and meaning of activity and occupation. We constructed activities histories with ourselves and learned to conduct an activities-based interview with clients. We divided into small groups to create ways to incorporate neurobehavioral therapy into independent living skills. The emphasis was on activity analysis and synthesis. To expand our repertoire of activities, therapists went to shopping centers to analyze what therapeutically relevant activities could be discovered in hardware, sporting goods, and toy stores. Last, we banned for periods of time certain over-used treatment modalities to force us to generate alternatives. Prohibited media included pulleys, bilateral sanders, mat tables, pegs, cones, and the ubiquitous Developmental Learning Materials.

The result of the inservice education program was appraised a year later when activities patterns of our professional practice were re-evaluated. It was difficult on this occasion to allocate therapy time according to segregated performance components. Neurobehavioral treatment was directed toward functional application in the environment, and activities served to integrate performance subskills into purposeful action. Thus, we found that neurobehavioral approaches had much to contribute to occupational therapy practice when modified to reflect the unique perspective of the profession.

**Connection of Research to Practice**

In order to refine our body of knowledge and develop more precise and utilitarian frames of reference, the relationship between research and practice needs clarification. The current knowledge explosion in the biological and behavioral sciences creates a dilemma for the clinician regarding ways to select and apply new concepts to therapy. Three common approaches are used to translate findings into practice (32). In the "popularization method" technical studies are interpreted into an easy, intellectually accessible form. Without caution, this approach can degenerate into isolated techniques segregated from their theoretical underpinnings. An example of this occurrence is the unrestricted use of bilateral sanding for hemiplegic clients out of context of Brunnstrom's frame of reference, which originally advocated the activity under carefully prescribed conditions (33, 34).

A variation on this theme is the voguish emphasis over the years in particular neurological structures. In need of a label, this trend is referred to as "the quest for the sacred homunculus." In reviewing my professional career, I first became enamored with the muscle spindle, expanded to the alpha-gamma coactivation system, moved to the reticular activating system, relocated to the limbic lobe, and later left half of my colleagues in the popularization method.

Although the popularization method can increase use of research data, precision is often lost in the interpretation.

A second approach is termed the "empirical method," in which the therapist reads research reports and case histories and applies their conclusions directly in practice. This strategy is severely limited by the lack of exact fit between a clinical condition described in the literature and the needs of a particular client. In addition, specific treatment procedures are seldom reported in a manner that allows for precise duplication of the intervention. It is hazardous to adopt therapeutic practices based on the results of one or two clinical research studies. Such findings may be particular to the research sample and the experimental design. A need exists for replication of studies to establish the generality of results to various clinical settings and populations.

The third and most effective approach is the process of relating research to an appropriate theory rather than attempting immediate application of the studies. In this method the research findings are
taken into the body of knowledge of the profession to be studied, and they are tentatively included in the theoretical base of frames of reference. With further experimental investigation the theoretical statements can be confirmed, rejected, or modified. This approach demonstrates the manner in which research shapes the development of theory and theory directs research. As Krueger and associates have noted, “Without data theories are empty and without theory data are blind.” (12, p 188)

All therapists have some system or viewpoint that monitors their practice (21). Actions are grounded on some expectation of behavioral outcome. What differentiates therapists is the degree to which their system has become elaborated and made explicit. Therapists vary in their level of awareness regarding the philosophical assumptions and theoretical foundations of their practice and their ability to communicate them to others. A professional is distinguished from a technician by knowledge of the propositions that guide his or her actions and the conscious selection of those propositions to influence change. In a practice based on theory, the therapist is able to ascertain the relationship between a client’s need and a theoretical principle, and apply intervention procedures on the basis of accurate prediction of outcome (35).

The theories relevant to occupational therapy vary in their degree of verification through research. It should not be disheartening that many questions remain unanswered regarding the psychological and physiological processes of adaptive behavior. An old Gaelic maxim suggests that knowledge does not proceed from understanding but rather from questioning.

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