

1995 Eleanor Clarke Slagle Lecture

Occupation:  
*Purposefulness and Meaningfulness as  
Therapeutic Mechanisms*

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I chose the topic of *therapeutic occupation* because that was what attracted me to the profession, and it is the concept about which I have thought most. I became an occupational therapist because I liked arts and crafts and “medical things.” When I was about 11 years old, my friend’s sister came home with paintings and jewelry and other things she had made at college. She was enrolled in the occupational therapy program at the University of New Hampshire and told me she was preparing to work in a hospital using arts and crafts to help people get better. I decided then and there that that was the profession for me. So eventually I went to the university and enjoyed learning all those activities. Those were the days when a large proportion of the curriculum was devoted to developing knowledge and skill in crafts. We learned technique from artists and theory in our occupational therapy classes. We learned that activities were therapeutic because they were purposeful, that is, they demanded certain responses that might be deficient in people who had a disease or injury, and that by doing activities, people improved their skills and abilities. We learned how to adapt activities to change the demands as the person changed. We also learned that because the person got to choose from several activities that demanded similar responses, the chosen activity was meaningful and kept the person interested and working. These beliefs were based on anecdotal observations passed down from early occupational therapists.

These beliefs are still taught, but have hardly been researched. Current economic and scientific forces in our society require us to provide support for the hypothesis that engagement in purposeful and meaningful occupation improves impaired abilities or produces occupational functioning. It would be to our advantage also to discover *how* therapeutic occupation brings about those changes so that we can treat more effectively.

Because I have always felt the need to know more about what made occupation therapeutic, I took the opportunity of this lecture to attempt to sort out some concepts concerning therapeutic occupation for myself and to pull together evidence for whether and how

occupation is therapeutic. My goal is to spark an explosion of research concerning therapeutic occupation.

If there is novelty in this lecture, to paraphrase White (1959), it lies in examining pieces that already lie before us, in seeing how to fit those pieces into a larger conceptual picture, and in determining what new pieces are needed to complete the picture.

## Occupation

In the early days of occupational therapy, crafts were used as diversions, as general methods of recovery from disease and injury (Llorens, 1993; Slagle, 1914), and for their utilitarian value because products were produced that could be sold (Haas, 1922). The purpose of the craft was to keep the patient occupied so that manic or depressive thoughts would be replaced (Dunton, 1914). Replacement happened because one cannot think about two things at once and occupation compelled attention. Believed prerequisite to the therapeutic value of the craft were the patient's feelings of interest and personal pride, which the instructor needed to instill if not evoked by the activity itself (Purdum, 1911). It was Susan Tracy who moved occupational therapy into the general hospital (Barrows, 1917; Editorial, 1929). She emphasized that the product was the patient, not the article he or she makes, and thereby changed the focus of occupation from a money-making enterprise to a specific therapeutic one (Barrows, 1917; Parsons, 1917). Occupation was primarily prescribed to remediate impairment (Barrows, 1917; Swaim, 1928), although there is a report that Tracy developed what we now call a *universal cuff* to enable persons to feed themselves (Cameron, 1917). By 1930, therapists were being invited to move beyond remediation to join the rehabilitation effort. The philosophy of rehabilitation is to focus not on what is lost, but on what capabilities remain, to prepare the person for return to the fullness of life's activities (Lowney, 1930). Occupation came to include activities of daily living (ADL) and prevocational training.

In the past several years papers have been written and several conferences held to discuss occupation, but consensus about what occupation is and is not continues to elude us. Nelson (1988) presented a detailed conceptualization of occupation in which he defined occupation as the relationship between occupational form and occupational performance. By *occupational form* he meant the task demands and environmental context. By *occupational performance* he meant the act of doing. According to his view, *therapeutic occupation* is the synthesis of an occupational form by the occupational therapist that either enables the patient to compensate to achieve a goal activity or produces an adaptive change in what Nelson called the person's developmental structure (1990). In this conceptualization, any voluntary activity a person does of *whatever complexity* is considered occupation as long as the occupational form of the activity has meaning from the person's point of view and the performance is based on a sense of purpose. According to this conceptualization, reaching for something of interest and preparing one's lunch are both occupations.

Occupation is limited to complex activity sequences by others. Clark and her colleagues (1991) defined occupation as "chunks of culturally and personally meaningful activity in which humans engage that can be named in the lexicon of the culture" (p. 301). By that they meant such things as doing one's job, dressing, cooking, and gardening. Christiansen and

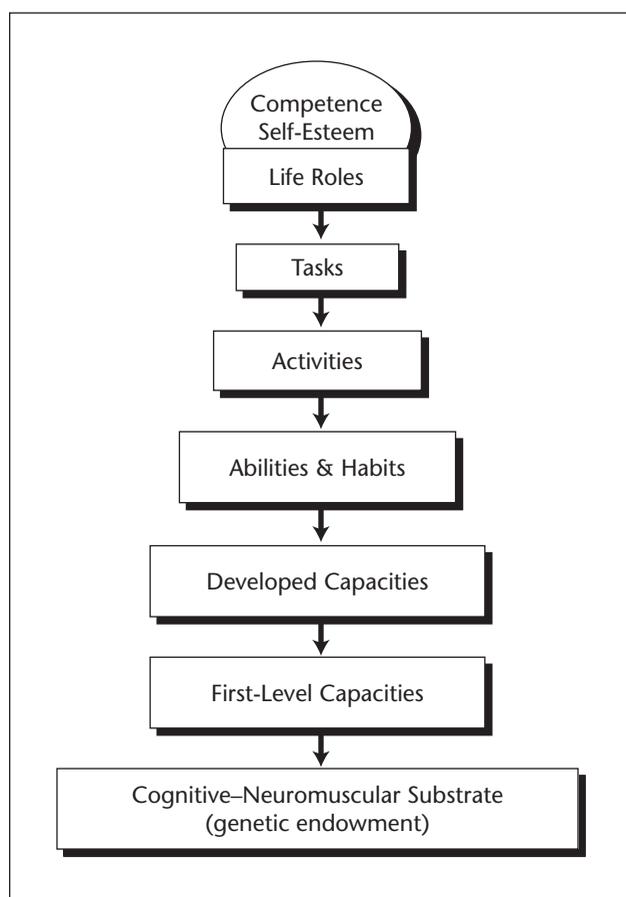
Baum, as reported by Christiansen (1991), defined *occupation* as all goal-oriented behavior related to daily living, including spiritual and sexual activities. In their view, the basic unit of occupation is activity. They defined *activity* as specific goal-oriented behavior directed toward the performance of a task. Bathing is an example of a task; filling the bathtub and washing one's self are examples of activities. They acknowledged that abilities are required to engage in activities and tasks, but did not seem to include this level in their characterization of occupation. *Occupation*, as defined by Clark and her colleagues and by Christiansen and Baum, seems to assume ability to perform. For those who treat patients with physical impairments, occupation thus defined is problematic because most of our patients cannot perform.

### A Model of Practice for Physical Dysfunction

I want to suggest a different way of considering therapeutic occupation, but first I need to tell you how I view the practice of occupational therapy for adults with physical dysfunction and define some terms. I am limiting my examples to physical dysfunction because that is what

I know best, although the ideas apply to many areas of practice. The model I am presenting is not my original idea. I think it has been used since the inception of the application of occupational therapy to this population, but I have named it the model of occupational functioning (Trombly, 1993). This model of practice parallels a certain conceptualization of occupational performance. This conceptualization of occupational performance is a descending hierarchy of roles, tasks, activities, abilities, and capacities (see Figure 43.1).

In the model of occupational functioning, the goal of occupational therapy is to develop a sense of competency and self-esteem. A competent person has sufficient resources to interact effectively with the physical or social environments and to meet the demands of a situation (White, 1959). A sense of competency is highly associated with feelings of



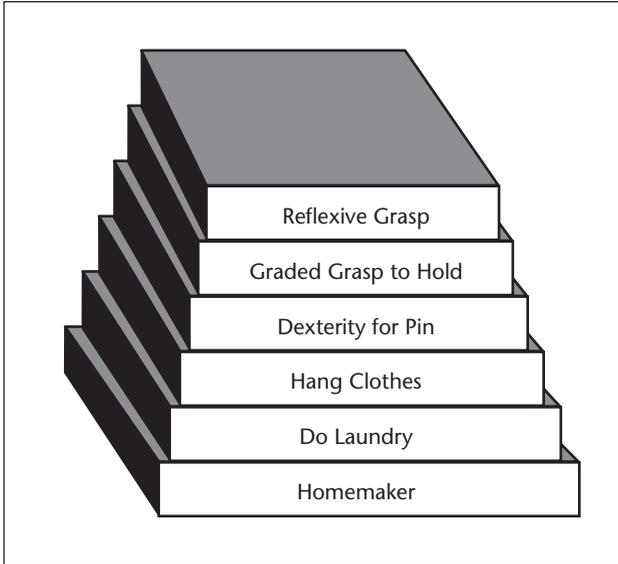
**Figure 43.1.** Conceptualization of occupational performance.

self-efficacy (Abler & Fretz, 1988; Bandura, 1977), a belief that one is capable of accomplishing a goal. To be competent means to be able to satisfactorily engage in one's life roles (or to voluntarily reassign a role to another). The American Occupational Therapy Association (AOTA) (1994) categorized roles into the three performance areas of work, play and leisure, and activities of daily living. However, I prefer to categorize roles from the point of view of the person (Trombly, 1993)—for example, roles that relate to self-achievement or productivity; roles that are essentially self-enhancing or that add pleasure or joy to one's life; and roles that maintain the self, which in my view includes family preservation and home maintenance.

Any categorization, however, is deceptive in that it implies that particular roles can be unequivocally classified into one category or another. They cannot. A particular person may categorize one role as an achievement-productivity role, whereas someone else may classify the same role as an enhancement-recreational role. The example that comes quickest to mind is the role of shopper. For some persons shopping is recreation and adds joy to their lives; for others, shopping is a chore done simply to acquire the raw materials needed for living. The category depends upon the meaning that the role has for the person. This fact becomes readily apparent when we note the results of a study by Yerxa and Locker (1990). They examined how 15 subjects with spinal cord injury categorized their daily activities. They found that the same activity was often placed into different categories. For example, eating was categorized by different subjects as self-maintenance, rest, play, and "other."

In order to engage satisfactorily in a life role, a person must be able to do the tasks and activities that make up that role within the natural context. Some tasks are essential to the role and must be mastered by whoever chooses the role. For example, the role of bus driver requires that the person be able to do the activity of steering the bus on a city street. Other roles are defined by the person so that the same role may be constituted in terms of different tasks by different persons. For example, one woman might consider the task of helping with homework an essential aspect of her mother role, whereas another, like the patient with chronic back pain interviewed by Nelson and Payton (1991), might consider roughhousing with her children as very important to that role. The patient, or a significant other, decides which roles the patient should work toward resuming. Furthermore, the person decides which tasks and activities constitute particular roles according to his or her values as well as socio-cultural mores and expectations.

To go on with the description of the occupational functioning model, tasks are composed of *activities*, which are smaller units of behavior. For example, peeling a potato is an activity within the task of meal preparation. To continue further down the hierarchy, in order to be able to do a given activity, one has to have certain sensorimotor, cognitive, perceptual, emotional, and social abilities. *Abilities* are skills that one has developed through practice and that underlie many different activities—for example, eye-hand coordination. Abilities emanate from developed capacities that the person has gained through learning or maturation. *Developed capacities* are refinements, gained through maturation and learning, of biologically based capacities. Graded grasp to accommodate the size and shape of an object is an example of a developed capacity. Developed capacities depend upon first-



**Figure 43.2. Nesting of levels of occupation.**

level capacities. *First-level capacities* are reflex-based responses or sub-routines that underlie voluntary movement and derive from a person's genetic endowment or spared organic substrate. For example, reflexive grasp and reflexive release, which underlie the higher capacity of graded grasp, are first-level capacities.

In this conceptualization, complex occupations, such as maintenance of one's clothes, have progressively simpler occupations nested within them (see Figure 43.2) (e.g., doing the laundry, hanging clothes on a clothesline, fastening the clothespin, grasping

the clothespin). This nesting contributes to our quandary in characterizing what is, and what is not, occupation and in building a theory of therapeutic occupation. A second dimension that makes occupation difficult to define is time: occupations comprise a range of time from brief moments to the entire lifespan (Nelson, 1988; Yerxa et al., 1990). So not only does occupation have a vertical dimension, complexity, as I have just described, but it also has a horizontal dimension, time.

### **Another Look at Occupation**

For me, one way to begin the characterization of occupation was to notice, in the process of thinking about the occupational functioning model, that in some situations we consider occupation as the goal to be learned and in other situations we consider occupation as the change agent. I have termed these *occupation-as-end* and *occupation-as-means*. I suggest this distinction because I think the goals and therapeutic processes of these two forms of occupation are different. Furthermore, there is historical basis for this separation because these two uses of occupation came into occupational therapy practice at different times. I equate the idea of *occupation-as-end* to the levels of activities, tasks, and roles in the occupational functioning model. At each of these levels, the person has a functional goal and tries to accomplish it by using what abilities and capacities he or she has. I think this is close to how Clark and others (1991) and Christiansen and Baum (Christiansen, 1991) defined occupation. *Occupation-as-means*, on the other hand, is *the therapy* used to bring about changes in impaired performance components. Occupation at this level often is limited to simple behaviors. Both *occupation-as-end* and *occupation-as-means* garner their therapeutic impact from the qualities of purposefulness and meaningfulness.

## **Purposefulness in Occupation-as-End**

Occupation-as-end is purposeful by definition. According to many occupational therapy writers, purposeful occupation-as-end organizes a person's behavior, day, and life (Kielhofner, 1985, 1992; Meyer, 1922/1977; Slagle, 1914; Yerxa & Baum, 1986; Yerxa & Locker, 1990; Yerxa et al., 1990). Early occupational "workers" imposed purposeful occupation on persons who could not choose it for themselves; they were then able to act in more healthy ways (Slagle, 1914). Time-use studies indicate that people who are mentally able to envision goals distribute their awake time among occupational tasks and activities. The studies also indicate that this distribution is affected by age (McKinnon, 1992) or disability (Yerxa & Baum, 1986; Yerxa & Locker, 1990). For example, Yerxa and Baum found that the number of hours that community-living subjects with spinal cord injury devoted to particular occupations differed significantly from the number of hours their friends without disabilities devoted to those occupations. The subjects with spinal cord injury worked fewer hours and devoted more hours to occupations categorized as "other," which for some subjects included shopping, going to church, eating, or watching television. The problem with this study, for our purposes, is that subject-designated categories were used as the data. Subjects categorized the same occupation (e.g., eating) differently. Further research is needed concerning purposefulness in occupation-as-end. Time-use studies inform us that persons fill their time with activities and tasks that they can name and categorize. However, I found no studies in our literature on how occupation-as-end organizes persons' lives. One paradigm that might be fruitful is to examine how persons without mental illness, who are recently retired, in extreme circumstances such as in prison or lost in the wilderness, or even on extended lazy vacations try to impose organization on their lives by planning and carrying out purposeful occupations of various complexities.

## **Meaningfulness in Occupation-as-End**

Occupation-as-end is not only purposeful but also meaningful because it is the performance of activities or tasks that a person sees as important. Only meaningful occupation remains in a person's life repertoire. Meaningfulness as a therapeutic aspect of occupation derives from our belief in the mind-body connection. The actions of the body are guided by the meaning ascribed to them by the mind (Bruner, 1990). Meaningfulness of occupation-as-end is based on a person's values that derive from family and cultural experiences. Meaningfulness also derives from a person's sense of the importance of participating in certain occupations or performing in a particular manner; or from the person's estimate of reward in terms of success or pleasure; or perhaps from a threat of bad consequences if the occupation is not engaged in.

Meaning is individual (Bruner, 1990) and although the occupational therapist can guess what may be meaningful based on a person's life history, he or she must verify with each patient that the particular occupation is meaningful to that person *now* and verify that the person sees a value in relearning it. The therapist cannot substitute his or her own values in selecting appropriate occupational goals for the patient. Two studies concerning differences in valuing between therapist and patient come to mind. In 1974, Taylor reported that the values attached to goals by 19 occupational therapists differed significantly from

those of 44 patients with spinal cord injuries. The patients valued development of work tolerance most, followed by bladder and bowel control. They did not value ADL skills highly. The therapists valued development of adapted devices and ADL skills most and bowel and bladder control least. Chiou and Burnett (1985) surveyed 26 patients living at home after stroke to determine the relative importance of 15 ADL tasks to each of them. Then the researchers paired each patient with one or more of 10 visiting occupational therapists and physical therapists who were treating these patients, to form 29 pairs. Patients and therapists, independently, ranked the 15 items from not at all important to very important for the particular patient. Scores for each patient and therapist pair were correlated. Only one of the 29 pairs yielded a significant correlation, and that was only of moderate strength [.57]. These results seem to indicate that therapists were not good judges of the value ascribed by patients to particular ADL tasks.

The meaningfulness of occupation-as-end is so profound that people at least partially define life satisfaction in terms of competent role performance. For example, in the study by Yerxa and Baum (1986) of 15 subjects with spinal cord injuries and their 12 friends without disabilities, a significant, moderate correlation of  $r = .44$  was found between satisfaction with performance in home management and overall life satisfaction. A slightly higher correlation of  $r = .62$  was found between satisfaction with performance of community skills and overall life satisfaction. Bränholm and Fugl-Meyer (1992) surveyed 201 randomly selected 25- to 55-year-old northern Swedish persons without disabilities to determine what value they attached to certain roles in relation to their perceived level of life satisfaction. Roles associated with vocation, family life, leisure, and home maintenance correctly classified 62% to 78% of the subjects in terms of satisfaction with life. Smith, Kielhofner, and Watts (1986) studied 60 persons with a mean age of 78 years, half of whom were institutionalized, to determine the relationship between engagement in daily occupations and life satisfaction. They found that those subjects who were classified into the high satisfaction category engaged in recreation and work significantly more and in ADL and rest significantly less than those classified in the low satisfaction category.

### **Therapeutic Achievement of Occupation-as-End**

I think that occupation-as-end is brought about by teaching the activity or task directly, using whatever abilities the patient has at his or her disposal or providing whatever adaptations are necessary. It is the Rehabilitative Approach (Trombly, 1995a) or skills training approach (Rogers, 1982). In this approach, occupations are analyzed to ensure that they are within the capabilities of the patient, but are not used to bring about change in those capabilities, per se. The patient learns, with the help of the therapist as teacher and as adaptor, of the task demands and context. In the therapeutic encounter, the therapist organizes the subtasks to be learned so that the person will succeed, provides the feedback to ensure successful outcome, and structures the practice to promote improved performance and learning. The purpose of the activity or task is readily apparent to the patient and, if the therapist has allowed patient goals to guide treatment, it is meaningful. Therapeutic principles for this approach derive from cognitive information processing and learning theories.

## Occupation-as-Means

Occupation-as-means refers to occupation acting as the therapeutic change agent to remediate impaired abilities or capacities. Various arts, crafts, games, sports, exercise routines, and daily activities that are systematically selected and tailored to each person (Cynkin & Robinson, 1990) are examples of occupations-as-means. Occupation in this sense is equivalent to what is called *purposeful activity* (AOTA, 1993). Purposeful activity demands particular, more circumscribed responses than occupation-as-end.

The therapist analyzes the occupation to determine that it demands particular responses from the person and that the responses demanded are slightly more challenging than what the person can currently easily produce. The therapist provides the opportunity to engage in the potentially therapeutic occupation (Meyer, 1922/1977), and as the person makes the effort and succeeds, the particular impairment that the occupation-as-means was chosen to remediate is reduced.

Although occupation is provided, therapy may be absent. What makes occupation-as-means therapeutic? First, the activity must have a purpose or goal that makes a challenging demand, yet has a prospect for success. Second, it must have meaning and relevance to the person who is to change so that it motivates the will to learn and improve (Cynkin & Robinson, 1990). The therapeutic aspects of occupation used as a means to change impairments, then, are purposefulness and meaningfulness.

### Purposefulness in Occupation-as-Means

Occupation-as-means is based on the assumption that the activity holds within itself a healing property that will change organic or behavioral impairments. We have further assumed that those inherent therapeutic aspects can be reliably identified through the activity analysis process (Llorens, 1986, 1993). However, if that assumption were true, therapists should fairly unanimously identify the inherent characteristic components of particular activities. But Tsai (1994), who surveyed 120 therapists experienced in the treatment of stroke, found poor consensus on the sensorimotor, cognitive-perceptual, or psychosocial components demanded by five particular activities that are commonly used in the treatment of patients who have had a stroke, such as stacking cones, putting on a shirt, and making a sandwich. Neistadt, McAuley, Zecha, and Shannon (1993) also reported discrepancies among therapists in identifying components required to do common activities.

### Research Related to Purposefulness of Occupation-as-Means in the Motor Domain

When analyzing activities to remediate motor impairments, we have assumed that there are inherent aspects of an activity that elicit particular muscular responses. However, this assumption is not supported by electromyographic evidence. If the therapeutic benefit were inherent in the activity, then whenever any person did that activity, the effects should be similar from trial to trial and similar from person to person, especially in those with normal biomechanical and neuromuscular systems. However, a colleague and I completed an

electromyographical study some years ago that examined the responses of hand muscles of 15 persons without disabilities when they were doing 16 different occupational therapy hand activities (Trombly & Cole, 1979). I had assumed in designing this study that if the goal was the same (e.g., “open this lock with this key”), and placement of objects was the same from subject to subject, and if each subject was positioned the same in relation to the objects (i.e., if the task demands were the same), then the same muscles would be used at similar levels by the various subjects. However, the results indicated that each subject used his or her own muscle activation pattern and amount of muscle activity. This finding was contrary to my expectations, but fully in agreement with predictions of Bernstein (1967).

Bernstein theorized that neuromuscular variability between trials is due to the redundancies in the musculoskeletal systems. Such redundancies allow the same goal to be accomplished effectively by a wide variety of muscle combinations and movement patterns (Horak, 1991; Morasso & Zaccaria, 1986; Newell & Corcos, 1993). Bernstein’s ideas, and the evidence that supports them, contributed to the paradigm shift to the dynamical systems theory of motor control. The term *dynamical systems* refers to any area of concern in which order and pattern emerge from the interaction and cooperation of many systems (Hawking, 1988). Applied to motor behavior, dynamical systems refers to movement patterns that emerge from the interaction of multiple systems of the person and performance contexts to achieve a functional goal (see Figure 43.3) (Haugen & Mathiowetz, 1995; Mathiowetz & Haugen, 1994, 1995).

According to Bernstein’s hypothesis, the central nervous system temporarily yokes muscles together to constrain the number of degrees of freedom to within its capability of control at the moment, given the current resources of the person and the particular demands of the context. This synergic coupling, or coordinative structure, forms as needed at the moment and then dissolves. The next time the person does the same thing, his or her muscles may be more warmed up, or there may be a slight difference in placement of task object in relation to the active limb, so a new coordinative structure evolves. That is, different muscles may be recruited, or the same muscles used before may be more or less active in order to accomplish the movement goal in the most efficient way. The motor goal is constant or invariant and requires a constant, invariant response, but this response can be fulfilled by a varying set of muscular contractions (Luria, 1973). The goal or purpose seems to organize the most efficient movement, given the constraints of person and context (see Figure 43.3).

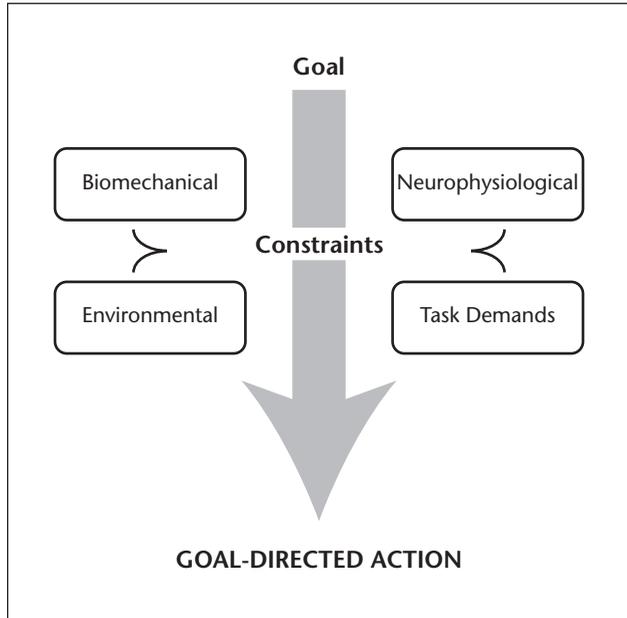
What evidence is there that purpose organizes behavior? Motor commands issued to moving segments are not accessible to an experimenter and must be inferred from study of the limb trajectories that they ultimately produce (Jeannerod, 1988). Limb trajectories are recorded with instruments designed to track the spatial-temporal aspects of movement. Different spatial-temporal patterns, which are indicative of differences in movement organization, emerge for particular goals (Jeannerod, 1988). Movement organization can be detected from the shape of the velocity profile (Georgopoulos, 1986; Kamm, Thelen, & Jensen, 1990) that changes depending on goal (Nelson, 1983). The goal of reaching to a large target that does not demand accuracy produces a unimodal and bell-shaped velocity profile. The goal of reaching precisely to a target, which requires accurate, guided

movement, on the other hand, has a left-shifted velocity profile because more time is spent in deceleration than in acceleration.

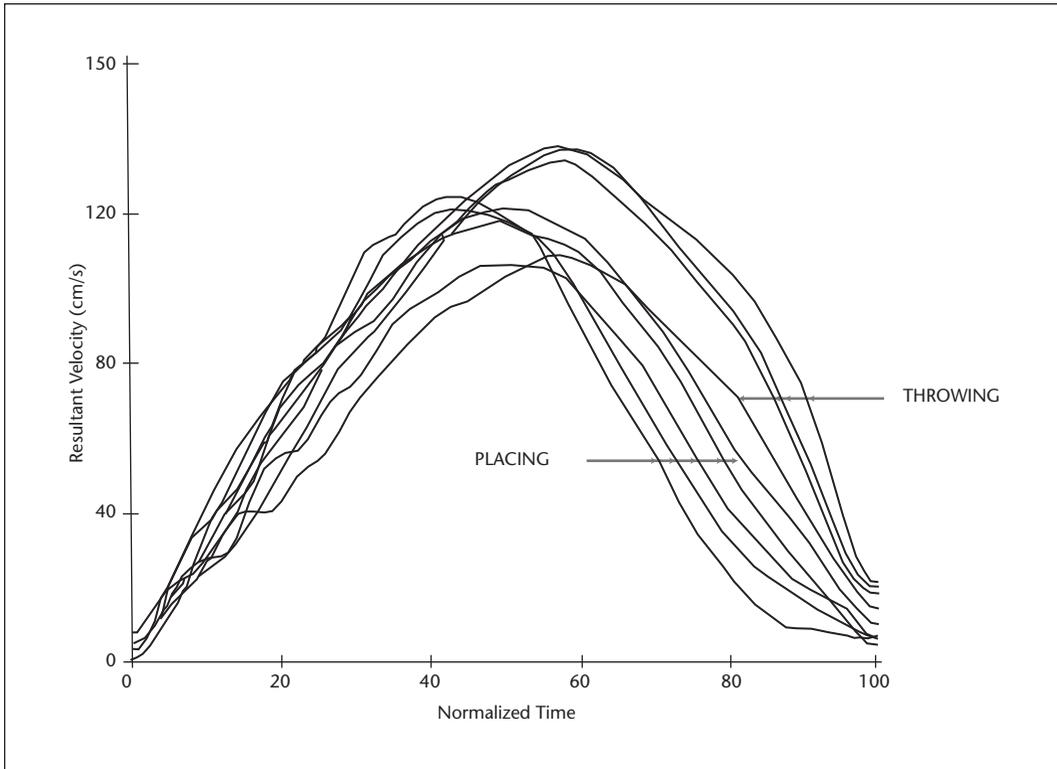
In 1987, Marteniuk, MacKenzie, Jeannerod, Athenes, and Dugas demonstrated for the first time the impact of goal on the organization of movement. They found that five university student subjects used a different movement organization when they reached for the same object for two different purposes. One goal was to pick up a 4-cm disk and place it in a slot; the other goal was to pick up the same disk and throw it into a basket. The task demands and the context were exactly the same. Only intent after the reach was different. The different purposes produced two different velocity profiles (see Figure 43.4),

indicating different movement organizations, for the reaches to the disk. Reaches before placing the disk into a slot produced a left shift of velocity profile in which a significantly greater percentage of total reach time was spent in the deceleration phase and the acceleration phase was significantly shortened as compared to reaches before the throwing condition.

Mathiowetz (1991) tested whether the same motor organization was elicited when 20 subjects with multiple sclerosis performed functional tasks in natural, impoverished, partial, and simulated conditions. In one of the experiments, the subjects actually ate applesauce with a spoon in the natural condition; pretended to eat applesauce, with no applesauce, spoon, or dish present in the impoverished condition; pretended to eat applesauce with a dish and spoon, but no applesauce present in the partial condition; or did, in the simulated condition, the feeding subtest of the Jebsen–Taylor Hand Function Test (Jebsen, Taylor, Trieschmann, Trotter, & Howard, 1969) that requires the subject to pick up kidney beans with a spoon and transfer them to a can placed in front of him or her. The outcomes of each trial were described qualitatively in phase plane diagrams in which velocity is graphed against displacement. These should be replicable from trial to trial if the subject is using the same movement organization. However, the phase planes were judged, by experienced judges, to be different among the four conditions. Figure 43.5 depicts two trials of two conditions, the natural and the simulated, by one subject. The repeated trials are similar, but the two conditions are different. Because subjects produced unique phase planes for each condition, Mathiowetz concluded that subjects perceived each condition as an unique activity, having a different goal.



**Figure 43.3. Dynamical systems theory of motor control hypothesizes that goal-directed action emerges from a synthesis of goal or purpose and personal and contextual constraints.**

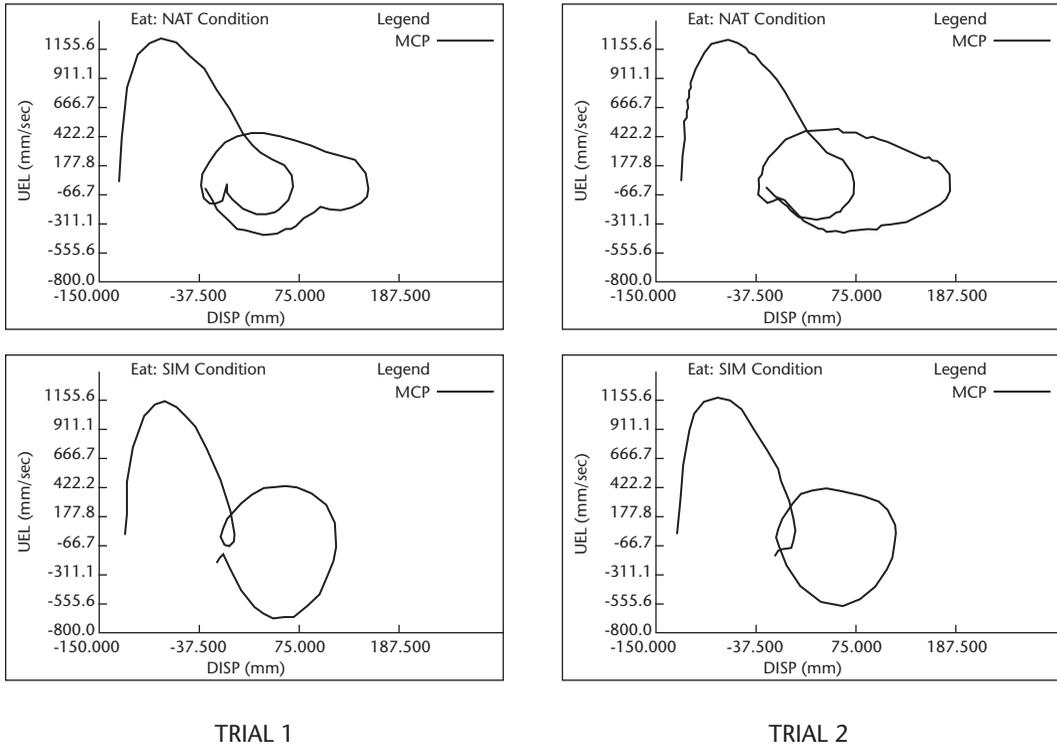


**Figure 43.4. Velocity profiles for reaches to a 4-cm disk, after which the goal was to fit the disk into a slot or to throw it into a basket.**

Note. From Marteniuk, R. G., MacKenzie, C. L., Jeannerod, M., Athenes, S., & Dugas, C. (1987). Constraints on human arm movement trajectories. *Canadian Journal of Psychology*, 41(3), 365–378. Used with permission.

In another test of differences in goal situation, Van der Weel, van der Meer, and Lee (1991) tested nine children of average intelligence, aged 3 to 7 years, who had right hemiparesis. They measured the children's range of supination and pronation movement when moving a drumstick back and forth in the frontal plane with the instruction "to move as far as you can" (the abstract condition). The children had previously experienced the full range of movement passively. Range was also measured when the children were told to use the same drumstick to "bang the drums" which were placed to require full range of motion (the concrete condition). Movement range was significantly greater ( $t_8 = 6.75, p < .0001$ ) for the concrete task of banging the drums than for the abstract task, which had a vague goal.

Wu (Wu, 1993; Wu, Trombly, & Lin, 1994) investigated whether actually reaching for a pencil to write one's name, reaching the same distance for an imagined pencil, or reaching forward in a biomechanically similar way would produce different outcomes in terms of the organization of movement. In the sample of 37 college-aged subjects without disabilities, the materials-based occupation of reaching for an actual pencil elicited significantly different and more efficient organization of movement than imagery-based occupation of reaching for a pretend pencil or exercise. The reach was faster ( $F_{2, 62} = 20.44, p < .001$ ) and straighter



**Figure 43.5. Phase planes (velocity  $\times$  displacement) of two trials of two conditions (natural and simulated) by one normal subject.**

Note. From Mathiowetz, V. G. (1991). *Informational support and functional motor performance*. Unpublished doctoral dissertation, University of Minnesota, Minneapolis. Used with permission.

( $F_{2, 62} = 23.25, p < .001$ ), was more preplanned ( $F_{2, 62} = 22.13, p < .001$ ), and used less force ( $F_{1, 62} = 6.13, p < .005$ ). The imagery-based occupation, on the other hand, produced a more guided, longer, and more convoluted path than did the exercise condition, probably because the goal was more vague in that condition.

Sietsema, Nelson, Mulder, Mervau-Scheidel, and White (1993) tested the effect of goal on overall active range of shoulder motion of 20 adults with brain injury. Each subject reached to a point 3 inches above the center of a table placed to require full forward reach. Each also reached the same distance to play a computer controlled game of flashing lights and sounds. Overall active range of motion was significantly greater as a result of the game than simply reaching to the more vague target ( $t_{19} = 5.77, p < .001$ ).

At least in terms of motor responses, then, purpose does appear to organize behavior. Of course, much more study is required to verify this finding.

### Meaningfulness in Occupation-as-Means

Whereas a meaningful occupation has purposefulness, strictly speaking, a purposeful activity may or may not be meaningful. Sharrott (1983) stated that the purpose of an action gives that action meaning. He may have been using *purpose* to denote the reason that a person does

something, or the motive, rather than the goal of the action. I think that confounding these terms will impede research. The purpose is the goal, the expected end result. The meaning is the value that accomplishment of that goal has for the person. I have an anecdotal example of the separation between the two concepts. Some years back, my father had a right cerebrovascular accident with resultant hemi-inattention. The occupational therapist gave him parquetry blocks to do. There were two purposes. One was the goal of the activity—to place all the blocks on the diagram. He understood the goal and tried to do what he was told. However, it had no meaning to him; he viewed this activity as a children's game and found it degrading. The therapeutic purpose, of course, was to improve his hemi-inattention. That purpose had no meaning to him either; he did not think he had hemi-inattention and did not get the connection between the child's game and the therapeutic goal.

What do we mean by *meaningful* and how does that quality of occupation-as-means affect behavioral responses? Meaning related to occupation-as-means may relate to basic values held by the person—similar to the way meaning is derived for occupation-as-end. However, meaning is probably generated from a less profound source when it applies to particular, circumscribed, time-limited activities used to promote some performance component. The meaningful aspect of occupation-as-means may be the emotional value that an interesting and creative experience offers the patient (Ayres, 1958). Or meaningfulness may stem from familiarity with the occupation, or its power to arouse positive associations, or the likelihood that completion of it will elicit approval from others who are respected and admired (Cynkin & Robinson, 1990), or its potential to contribute to recovery.

Although we often count on meaningfulness to emanate from the activity, there is no inherent meaningfulness quality in a particular occupation. Meaningfulness is individual. Bruner (1990) said that “action is interpretable only by reference to what the actor says he or she is up to” (p. 20). In therapy, meaningfulness is developed through an exchange between the therapist and the person to construct the meaning of the activity within the context of culture, life experiences, disability (Fleming, 1990; Kielhofner, 1992), and present needs.

### **Research Related to Meaningfulness of Occupation-as-Means**

The importance of meaningfulness to us as therapists is that we believe that it motivates. What evidence is there that meaning motivates behavior?

Meaningfulness has been operationalized in occupational therapy studies in one of three ways. One is to offer a choice, another is to provide a product, and the third is to enhance the context. The response, motivation, has been operationalized as the number of repetitions or length of time engaged in the occupation or as the effort expended.

*Choice.* Bakshi, Bhambhani, and Madill (1991) studied 20 female college students who chose their most preferred and least preferred activity from eight offered activities. They completed each under conditions of purpose and nonpurpose, defined respectively as working on a product or not. There were no differences in number of repetitions performed between the preferred and nonpreferred occupation. Differences between product and no-product conditions were not significant due to high variability (see Table 43.1). On the other hand, LaMore and Nelson (1993), in a more controlled study, did find a significant increase

in repetitions ( $Z = 2.9, p < .01$ ) when 22 adult subjects with mental disabilities were given a limited choice of which ceramic object to paint as compared with when they were told to paint a particular one.

*Product.* Thibodeaux and Ludwig (1988) tested whether performance time and heart rate (effort) would be significantly different when 15 occupational therapy students sanded a cutting board that they could keep as compared with when they sanded wood for no reason. Although the subjects reported enjoying the product-oriented activity significantly more and they worked longer at it, there was too much intersubject variability to detect significant differences between conditions (see Table 43.2).

*Enhanced context.* Riccio, Nelson, and Bush (1990) studied the effects of enhanced context. They tested the effect of imagery-based activity and exercise on the number of repetitions of 27 elderly nursing home residents when they reached up to pretend to pick apples and reached down to pretend to pick up coins versus when they simply reached up or down for exercise. There was a significant difference between the two conditions for the up direction ( $Z = 2.25, p = .012$ ), indicating that pretending to pick apples was more motivating than exercise. The outcome for reaching down was in the same direction, but nonsignificant ( $Z = 1.60, p = .055$ ), possibly because of a confounding effect of fatigue.

Lang, Nelson, and Bush (1992) tested the responses of 15 elderly nursing home residents under three conditions: materials-based activity, imagery-based activity, and exercise. In the materials-based condition, subjects actually kicked a red balloon. In the imagery-based condition, they pretended to kick a described balloon. In the exercise condition, they kicked as demonstrated. The number of repetitions associated with really kicking the balloon (54) was significantly greater ( $F_{2, 28} = 6.62, p = .004$ ) than those associated with imagining kicking the balloon (26) or kicking for exercise (18). This study was later replicated by DeKuiper, Nelson, and White (1993) on 28 elderly nursing home residents. Materials-based occupation produced significantly more repetitions than imagery-based occupation or rote exercise ( $F_{2, 54} = 12.1, p < .001$ ). In this study they also measured effort in terms of distance the foot was raised and speed of kick. There were no significant differences among the various contextual conditions for these variables (see Table 43.3).

A number of other researchers (Bloch, Smith, & Nelson, 1989;

**Table 43.1. Mean Number of Repetitions as a Result of Preference and Purpose in Assigned Tasks**

Purpose	Task Assigned	
	Preferred	Nonpreferred
Yes	63	63
No	83	84

*Note.* Based on Bakshi, R., Bhambhani, Y., & Madill, H. (1991). The effects of task preference on performance during purposeful and nonpurposeful activities. *American Journal of Occupational Therapy, 45*, 912–916.

**Table 43.2. Effects of Product-Oriented and Non-Product-Oriented Activities**

Measures	Product	
	Yes (Cutting Board)	No (Wood)
Preference	4.8	3.4*
Increased heart rate	13	17
Performance time	172	148

\* $p = .001$ .

*Note.* Based on Thibodeaux, C. S., & Ludwig, F. M. (1988). Intrinsic motivation in product-oriented and non-product-oriented activities. *American Journal of Occupational Therapy, 42*, 169–175.

**Table 43.3. Average Effects of Materials-Based Occupation, Imagery-Based Occupation, and Rote Exercise**

Measures	Type of Occupation and Exercise		
	Materials-Based	Imagery-Based	Rote
Repetitions to fatigue	127**	51	75
Distance foot lifted (cm)	29	31	26
Speed (cm/sec)	71	71	67

\*\* $p < .001$ .

Note. Based on DeKuiper, W. P., Nelson, D. L., & White, B. E. (1993). Materials-based occupation versus imagery-based occupation versus rote exercise: A replication and extension. *Occupational Therapy Journal of Research*, 13, 183–197.

cookies that the subjects could smell baking, squeeze a bulb to keep a ping-pong ball suspended in air or squeeze the same bulb for exercise. Some demonstrated significantly greater effort (heart rate) expended for the enhanced condition, but this was not a consistent finding (Bloch et al., 1989; Kircher, 1984; Steinbeck, 1986).

Meaningfulness, as operationalized by enhanced context, and possibly by choice, appears to motivate continued performance. However, more definitive research is needed. Additionally, basic research on what makes occupation-as-means meaningful and how best to operationalize this in both research and practice is needed.

### Practice and Research

As occupational therapists we want our patients to achieve role competence. We use occupation-as-end and occupation-as-means now to achieve that. We need to document the successes of our current practices, but we also need to reconsider some of our practices. For example, practice based on an ascending hierarchical model has emphasized remediation of occupational components because it is assumed that lower level skills and abilities are prerequisite to higher level functioning. Although this assumption makes logical sense—persons who cannot lift their arms certainly cannot comb their hair in the usual way—practice has sometimes emphasized treatment to increase strength and other capacities and abilities to the exclusion of teaching functional skills. However, a thorough review of the literature on stroke rehabilitation (Wagenaar & Meijer, 1991a, 1991b) indicated that gains in component functions are small and do not automatically result in improved functional performance. When the results of several correlational studies were averaged together, the average correlation between motor impairment and ADL was .56 and between perceptual impairment and ADL was .58 (Trombly, 1995b). By squaring the  $r$ , the amount of variance of ADL accounted for by motor impairment was 31% (see Figure 43.6). Therefore, 69% of variance associated with ADL derives from other factors. Even if motor impairment were 100% remediated, would the patient be able to do ADL without specific training and adaptation?

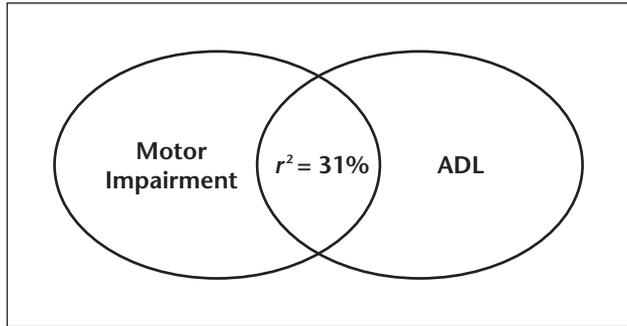
Kircher, 1984; Miller & Nelson, 1987; Steinbeck, 1986; Yoder, Nelson, & Smith, 1989) all demonstrated significantly greater numbers of repetitions or duration for what they termed purposeful versus nonpurposeful activity. The differences in the activities were actually differences in meaning in terms of context, not differences in purpose—the motoric purpose was the same: jump up and down or jump rope, stir dough for exercise or stir dough that will be made into

Studies are needed that compare skills training at the level of occupation-as-end with subskills training using occupation-as-means to effectively and efficiently achieve occupational functioning (Rogers, 1982).

How the purposefulness and meaningfulness aspects of both levels of occupation contribute to the therapeutic effect need explication to guide practice. We need to study

in more detail how purposefulness organizes behavior and meaningfulness motivates performance. The literature reviewed here is a beginning in this regard. Some of the studies reviewed indicated that the organization of motor behavior is different when the purposes or contexts are different, even if they are similar. This finding suggests that treatment in simulated contexts using simulated objects and simulated goals may not help a patient learn occupational performance for real life. Studies are needed to compare effectiveness of treatment with actual objects in natural contexts versus treatment with simulated objects in clinical settings. Follow-up studies of carryover of occupational performance from treatment center to home are also needed.

Those golden moments that we have all experienced as therapists probably came about when the patient succeeded in doing something that had great meaning to him or her. Sometimes we get complacent, though, and offer activities and occupations that we think ought to be meaningful to the person but are not really, or we offer a choice of activities from a selection in which none of the choices are meaningful. Much more attention needs to be applied to discovering the meaning of, or creating meaning for, therapeutic occupation. Methods to evaluate meaningfulness are needed both for research and practice. We need more well-controlled studies that test the effect of meaningfulness on perseverance and effort during therapy.



**Figure 43.6.** Pictorial description of  $r^2$ .

## Conclusion

Occupational therapy was founded on the belief that engaging in occupation brought about mental and physical health. Over the years we have redefined health, for our purposes, as occupational performance having many levels of organization. In this context, occupation can be seen both as end and as means. In both dimensions, meaningfulness and purposefulness are key qualities. Purposefulness organizes and meaningfulness motivates. Purposeful occupation-as-end seems to organize time and a person's description of his life. Meaningful occupation-as-end motivates the person's participation in life. Purposeful occupation-as-means organizes behavioral responses, at least as far as motor responses are concerned. Meaningful occupation-as-means seems to motivate the person to persevere in his efforts long enough to achieve a therapeutic benefit. Research is needed to verify each

of these hypotheses. I hope each occupational therapist will join me in taking responsibility to contribute to that effort.

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## References

- Abler, R. R., & Fretz, B. R. (1988). Self-efficacy and competence in independent living among oldest old persons. *Journal of Gerontology: Social Sciences*, *43*, S138–143.
- American Occupational Therapy Association. (1993). Position Paper—Purposeful activity. *American Journal of Occupational Therapy*, *47*, 1081–1082.
- American Occupational Therapy Association. (1994). Uniform terminology for occupational therapy—third edition. *American Journal of Occupational Therapy*, *48*, 1047–1054.
- Ayres, A. J. (1958). Basic concepts of clinical practice in physical disabilities. *American Journal of Occupational Therapy*, *12*, 300–302, 311.
- Bakshi, R., Bhambhani, Y., & Madill, H. (1991). The effects of task preference on performance during purposeful and nonpurposeful activities. *American Journal of Occupational Therapy*, *45*, 912–916.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review*, *84*, 191–215.
- Barrows, M. (1917). Susan E. Tracy, R. N. *Maryland Psychiatric Quarterly*, *6*, 57–62.
- Bernstein, N. (1967). *The coordination and regulation of movements*. Elmsford, NY: Pergamon.
- Bloch, M. W., Smith, D. A., & Nelson, D. L. (1989). Heart rate, activity, duration, and affect in added-purpose versus single-purpose jumping activities. *American Journal of Occupational Therapy*, *43*, 25–30.
- Bränholm, I-B., & Fugl-Meyer, A. R. (1992). Occupational role preferences and life satisfaction. *Occupational Therapy Journal of Research*, *12*, 159–171.
- Bruner, J. (1990). *Acts of Meaning*. Cambridge, MA: Harvard University Press.
- Cameron, R. G. (1917). An interview with Miss Susan Tracy. *Maryland Psychiatric Quarterly*, *4*, 65–66.
- Chiou, I-I. L., & Burnett, C. N. (1985). Values of activities of daily living: A survey of stroke patients and their home therapists. *Physical Therapy*, *65*, 901–906.
- Christiansen, C. (1991). Occupational therapy intervention for life performance (pp. 1–43). In C. Christiansen & C. Baum (Eds.), *Occupational therapy: Overcoming human performance deficits*. Thorofare, NJ: Slack.
- Clark, F., Parham, D., Carlson, M. E., Frank, G., Jackson, J., Pierce, D., Wolfe, R. J., & Zemke, R. (1991). Occupational science: Academic innovation in the service of occupational therapy's future. *American Journal of Occupational Therapy*, *45*, 300–310.

- Cynkin, S., & Robinson, J. M. (1990). *Occupational therapy and activities health: Toward health through activities*. Boston: Little, Brown.
- DeKuiper, W. P., Nelson, D. L., & White, B. E. (1993). Materials-based occupation versus imagery-based occupation versus rote exercise: A replication and extension. *Occupational Therapy Journal of Research, 13*, 183–197.
- Dunton, W. R., Jr. (1914). Roundtable. *Maryland Psychiatric Quarterly, 4*, 20–32.
- Editorial. (1929). Susan E. Tracy. *Occupational Therapy and Rehabilitation, 8*, 63–66.
- Fleming, M. (1990). Untitled invited paper presented at the American Occupational Therapy Foundation planning meeting for the Occupation Symposium, Boston, MA.
- Georgopoulos, A. P. (1986). On reaching. *Annual Review of Neurosciences, 9*, 147–170.
- Haas, L. J. (1922). Crafts adaptable to occupational needs: Their relative importance. *Archives of Occupational Therapy, 1*, 443–455.
- Haugen, J. B., & Mathiowetz, V. (1995). Contemporary task-oriented approach. In C. A. Trombly (Ed.), *Occupational therapy for physical dysfunction* (4th ed.) (pp. 510–528). Baltimore: Williams & Wilkins.
- Hawking, S. W. (1988). *A brief history of time: From the big bang to black holes*. New York: Bantam.
- Horak, F. B. (1991). Assumptions underlying motor control for neurologic rehabilitation. In M. Lister (Ed.), *Contemporary management of motor control problems. Proceedings of the II STEP Conference* (pp. 11–27). Alexandria, VA: The Foundation for Physical Therapy.
- Jeannerod, M. (1988). *The neural and behavioral organization of goal-directed movements*. Oxford: Clarendon.
- Jebsen, R. H., Taylor, N., Trieschmann, R. B., Trotter, M., & Howard, L. A. (1969). An objective and standardized test of hand function. *Archives of Physical Medicine and Rehabilitation, 50*, 311–319.
- Kamm, K., Thelen, E., & Jensen, J. L. (1990). A dynamical systems approach to motor development. *Physical Therapy, 70*, 763–775.
- Kielhofner, G. (Ed.). (1985). *A Model of Human Occupation*. Baltimore: Williams & Wilkins.
- Kielhofner, G. (1992). *Conceptual foundations of occupational therapy*. Philadelphia: F. A. Davis.
- Kircher, M. A. (1984). Motivation as a factor of perceived exertion in purposeful versus non-purposeful activity. *American Journal of Occupational Therapy, 38*, 165–170.
- LaMore, K. L., & Nelson, D. L. (1993). The effects of options on performance of an art project in adults with mental disabilities. *American Journal of Occupational Therapy, 47*, 397–401.
- Lang, E. M., Nelson, D. L., & Bush, M. A. (1992). Comparison of performance in materials-based occupation, imagery-based occupation, and rote exercise in nursing home residents. *American Journal of Occupational Therapy, 46*, 607–611.
- Llorens, L. A. (1986). Activity analysis: Agreement among factors in a sensory processing model. *American Journal of Occupational Therapy, 40*, 103–110.
- Llorens, L. A. (1993). Activity analysis: Agreement between participants and observers on perceived factors in occupation components. *Occupational Therapy Journal of Research, 13*, 198–211.
- Lowney, M.E.P. (1930). The relationship between occupational therapy and rehabilitation. *Massachusetts Association for Occupational Therapy Bulletin, 4*(2), no pages.
- Luria, A. R. (1973). *The working brain: An introduction to neuropsychology*. New York: Basic.
- Marteniuk, R. G., MacKenzie, C. L., Jeannerod, M., Athenes, S., & Dugas, C. (1987). Constraints on human arm movement trajectories. *Canadian Journal of Psychology, 41*, 365–378.
- Mathiowetz, V. G. (1991). *Informational support and functional motor performance*. Unpublished doctoral dissertation, University of Minnesota.

- Mathiowetz, V., & Haugen, J. B. (1994). Motor behavior research: Implications for therapeutic approaches to central nervous system dysfunction. *American Journal of Occupational Therapy, 48*, 733–745.
- Mathiowetz, V., & Haugen, J. B. (1995). Evaluation of motor behavior: Traditional and contemporary views. In C. A. Trombly (Ed.), *Occupational therapy for physical dysfunction* (4th ed., pp. 157–186). Baltimore: Williams & Wilkins.
- McKinnon, A. L. (1992). Time use for self care, productivity, and leisure among elderly Canadians. *Canadian Journal of Occupational Therapy, 59*, 102–110.
- Meyer, A. (1977). The philosophy of occupational therapy. *American Journal of Occupational Therapy, 31*, 639–642. (Reprinted from *Archives of Occupational Therapy, 1*, 1–10, 1922)
- Miller, L., & Nelson, D. L. (1987). Dual-purpose activity versus single-purpose activity in terms of duration of task, exertion level, and affect. *Occupational Therapy in Mental Health, 1*, 55–67.
- Morasso, P., & Zaccaria, R. (1986). Understanding human movement. *Experimental Brain Research, 15*, 145–157.
- Neistadt, M. E., McAuley, D., Zecha, D., & Shannon, R. (1993). An analysis of a board game as a treatment activity. *American Journal of Occupational Therapy, 47*, 154–160.
- Nelson, C. E., & Payton, O. D. (1991). A system for involving patients in program planning. *American Journal of Occupational Therapy, 45*, 753–755.
- Nelson, D. L. (1988). Occupation: Form and performance. *American Journal of Occupational Therapy, 42*, 633–641.
- Nelson, D. L. (1990). Untitled invited paper presented at the American Occupational Therapy Foundation planning meeting for the Occupation. Symposium, Boston, MA.
- Nelson, W. L. (1983). Physical principles for economies of skilled movements. *Biological Cybernetics, 46*, 135–147.
- Newell, K. M., & Corcos, D. M. (1993). Issues in variability and motor control. In K. M. Newell & D. M. Corcos (Eds.), *Variability and motor control* (pp. 1–12). Champaign, IL: Human Kinetics.
- Parsons, S. E. (1917). Miss Tracy's work in general hospitals. *Maryland Psychiatric Quarterly, 6*, 63–64.
- Purdum, H. D. (1911). The psycho-therapeutic value of occupation. *Maryland Psychiatric Quarterly, 1*, 35–36.
- Riccio, C. M., Nelson, D. L., & Bush, M. A. (1990). Adding purpose to the repetitive exercise of elderly women through imagery. *American Journal of Occupational Therapy, 44*, 714–719.
- Rogers, J. C. (1982). The spirit of independence: The evolution of a philosophy. *American Journal of Occupational Therapy, 36*, 709–715.
- Sharrott, G. W. (1983). Occupational therapy's role in the client's creation and affirmation of meaning. In G. Kielhofner (Ed.), *Health through occupation: Theory and practice in occupational therapy*. Philadelphia: F. A. Davis.
- Sietsema, J. M., Nelson, D. L., Mulder, R. M., Mervau-Scheidel, D., & White, B. E. (1993). The use of a game to promote arm reach in persons with traumatic brain injury. *American Journal of Occupational Therapy, 47*, 19–24.
- Slagle, E. C. (1914). History of the development of occupation for the insane. *Maryland Psychiatric Quarterly, 4*, 14–20.
- Smith, N. R., Kielhofner, G., & Watts, J. H. (1986). The relationships between volition, activity pattern, and life satisfaction in the elderly. *American Journal of Occupational Therapy, 40*, 278–283.
- Steinbeck, T. M. (1986). Purposeful activity and performance. *American Journal of Occupational Therapy, 40*, 529–534.

- Swaim, L. T. (1928). Does occupational work hasten recovery of the crippled? *Massachusetts Association of Occupational Therapy Bulletin*, 2(3), no pages.
- Taylor, D. P. (1974). Treatment goals for quadriplegic and paraplegic patients. *American Journal of Occupational Therapy*, 28, 22–29.
- Thibodeaux, C. S., & Ludwig, F. M. (1988). Intrinsic motivation in product-oriented and non-product oriented activities. *American Journal of Occupational Therapy*, 42, 169–175.
- Trombly, C. (1993). Anticipating the future: Assessment of occupational function. *American Journal of Occupational Therapy*, 47, 253–257.
- Trombly, C. (Ed.). (1995a). *Occupational therapy for physical dysfunction* (4th ed.). Baltimore: Williams & Wilkins.
- Trombly, C. A. (1995b). *Relationships between motor and perceptual performance components and activities of daily living*. Unpublished paper, Boston University.
- Trombly, C. A., & Cole, J. M. (1979). Electromyographic study of four hand muscles during selected activities. *American Journal of Occupational Therapy*, 33, 440–449.
- Tsai, P-L. (1994). *Activity analysis and activity selection among occupational therapists: A survey*. Unpublished master's thesis, Boston University, Boston.
- Van der Weel, F. R., van der Meer, A.L.H., & Lee, D. N. (1991). Effect of task on movement control in cerebral palsy: Implications for assessment and therapy. *Developmental Medicine and Child Neurology*, 33, 419–426.
- Wagenaar, R. C., & Meijer, O. G. (1991a). Effects of stroke rehabilitation (1): A critical review of the literature. *Journal of Rehabilitation Sciences*, 4, 61–73.
- Wagenaar, R. C., & Meijer, O. G. (1991b). Effects of stroke rehabilitation (2): A critical review of the literature. *Journal of Rehabilitation Sciences*, 4, 97–109.
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66, 297–333.
- Wu, C-Y. (1993). *The relationship between occupational form and occupational performance: A kinematic perspective*. Unpublished master's thesis, Boston University.
- Wu, C-Y., Trombly, C. A., & Lin, K-C. (1994). The relationship between occupational form and occupational performance: A kinematic perspective. *American Journal of Occupational Therapy*, 48, 679–687.
- Yerxa, E. J., & Baum, S. (1986). Engagement in daily occupations and life satisfaction among people with spinal cord injuries. *Occupational Therapy Journal of Research*, 6, 271–283.
- Yerxa, E. J., Clark, F., Frank, G., Jackson, J., Parham, D., Pierce, D., Stein, C., & Zemke, R. (1990). An introduction to occupational science, A foundation for occupational therapy in the 21st century. *Occupational Therapy in Health Care*, 6, 1–32.
- Yerxa, E., & Locker, S. (1990). Quality of time use by adults with spinal cord injuries. *American Journal of Occupational Therapy*, 44, 318–326.
- Yoder, R. M., Nelson, D. L., & Smith, D. A. (1989). Added-purpose versus rote exercise in female nursing home residents. *American Journal of Occupational Therapy*, 43, 581–586.