Balancing Art and Science and Private and Public Knowledge: A Matrix for Successful Practice

This issue of the *American Journal of Occupational Therapy* commemorates the work of A. Jean Ayres, an occupational therapist and neuropsychologist who, as a consummate clinician, developed a theory of sensory integration, created standardized tests and other measures to evaluate sensory integration, and designed a treatment approach to remediate sensory integrative dysfunction. Therapists throughout the world have used her evaluation methods and treatment approach to help patients attain a better quality of life. Although many characteristics of Ayres's successful practice are unique to her, we can examine and incorporate some of them into our own practice to increase our effectiveness. One hallmark of Ayres's practice is that she balanced art and science in her clinical practice, both in her evaluations and in her treatment, and used them equally as sources by which to obtain knowledge to build and verify theory. Another hallmark of her practice is that she consistently transferred, both privately and publicly, the knowledge she gained.

Because of Ayres's contributions to the field of occupational therapy and to the general knowledge base of normal and dysfunctional sensory processing, it may be helpful to explore the meaning, the use, and the relation of art and science in an occupational therapy practice and to examine the meaning and the implications of transferring knowledge privately and publicly. Understanding these concepts may help us to better understand Ayres's model of practice, especially its evolution, and also provide us with a greater understanding of the components of our own occupational therapy practice and assist us in appraising its current status more objectively.

The first, and most fundamental, component of the field of occupational therapy is that it is an "art and science" (American Occupational Therapy Association [AOTA], 1972, p. 204). Each of these elements, art and science, is a separate entity with its own distinguishable characteristics; when combined, they form a unified whole. The component of art and science is one of the basic principles that serve to define the complex profession of occupational therapy. By design, in the definition of occupational therapy, *art* and *science* are joined by the word *and*, thus suggesting that not only do both art and science form an important component in occupational therapy, but that each is of equal importance. One may interpret the phrase as implying that unless therapists use art and science equally in practice, they are not practicing occupational therapy fully.

**Art**

*Art* is defined by Webster's Third New International Dictionary (Gove, 1981) as "the power of performing certain actions, especially those acquired by experience, or observation" (p. 122). The dictionary states that art means dexterity, or the faculty, usually expert, of performing or executing what is planned or devised; skill is another synonym for art and means "technical knowledge, proficiency or expertness" (p. 122). Examples of an occupational therapist's use of art in clinical practice are listed below.

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The ability to develop rapport with a patient. Spending time developing rapport with a patient before performing an assessment is one of the arts that practitioners in many fields, including occupational therapy, use (Mosey, 1981). The reliability of the assessment results, either screening or evaluation, may depend on the degree of art the clinician has attained in developing rapport (King-Thomas & Hacker, 1987). To say that...
a physician has a good bedside manner refers to the physician's use of art to deal with the patient; the physician may have developed exceptional skills in making patients feel comfortable, for example.

**The ability to perform an evaluation well.** The therapist practices administering the evaluation instrument and learns to manipulate the equipment or supplies until he or she does so smoothly and expertly. The therapist works to develop skill and ease in using the instruments. Art in occupational therapy, therefore, is not an innate characteristic of the therapist. Although performing evaluations may come more naturally to some therapists, it usually results from practice. Going through the certification process developed by Sensory Integration International in Torrance, California, for certification in administering and interpreting the Sensory Integration and Praxis Tests (SIPT) (Ayres, 1989) is one way in which a therapist can increase the art of practice, and developing such skill is a responsibility (King-Thomas & Hacker, 1987). Stallings-Sahler, in her Brief or New article in this issue, discusses the process by which one becomes certified in administering and interpreting the SIPT. During the administration portion of the certification process, the therapist learns to skillfully manipulate the SIPT equipment, which is an example of acquiring art.

**Writing the report of an occupational therapy assessment.** Although the report itself may be based on information gained in a scientific manner, the actual writing of a report is an art. If two therapists evaluate the same child and obtain the same evaluation results, their reports may be quite different, although they contain essentially the same information and the same recommendations. Expository writing is an important art for an occupational therapist to acquire, because therapists must often communicate patients' information to others. The therapist may need to write not only evaluation reports and treatment plans, for example, but also letters to other professionals, proposals to request funding for programs, and reports to agencies documenting the need for treatment. An evaluation report may be written to different audiences, and the specific style of the report may vary depending on the intended audience. The two Case Report articles in this issue present the reports of two occupational therapists who have administered the SIPT to patients. Tupper's evaluation is intended for the patient's parents, and the style of its content represents an example of the art of taking technical and scientific material, which may overwhelm most parents, and capturing its essence in a written report. Stallings-Sahler's evaluation provides an example of a report written within a more theoretical context for a more knowledgeable audience.

**Physically handling or manipulating patients in a facile manner during assessments and treatment.** Ayres often demonstrated this art in her practice; however, the artful manipulation of clients is emphasized more in the evaluation and treatment techniques of neurodevelopmental therapy than it is in sensory integration therapy. The therapist can learn much about a patient through direct physical contact, and the extent of knowledge gained depends on the extent to which the therapist has developed an ability to learn through his or her own tactile system.

**Proficiently making observations when evaluating and treating a patient.** Occupational therapists are trained to observe patients carefully, and such clinical observations are an important part of both evaluating and treating patients, because they provide information that is usually not attainable in other ways. The information they provide supplements that obtained from formal (standardized or nonstandardized) tests.

Considering the role and the relation of art and science as they appear in AOTA's 1972 definition of occupational therapy can be helpful to practitioners because, as Peltoquin (1989) said, there appears to be a greater focus today on science than on art and it appears, at least at times, that the importance of art in the practice is being deemphasized, discounted, and diminished. This may be a reaction to the fact that for many years most occupational therapists relied primarily on the element of art to obtain information. Some therapists may now focus on science to counterbalance that earlier practice, whereas others may not distinguish between the two or understand the importance and role of each in a clinical practice. Art and science must be emphasized as elements of a unitary compound. A clinical practice should be neither an artistic nor a scientific practice exclusively but, rather, a combination of both.

**Science**

Many therapists may have a clearer understanding of the meaning of science than they do of art. Webster's dictionary (Gove, 1981) defines science as "a department of systematized knowledge as an object of study; knowledge covering general truths or the operation of general laws, especially as obtained and tested through scientific method. A system based or purporting to be based on scientific principles or methods" (p. 2032). Science, then, uses specific methods, referred to as scientific methods, which require that specific steps be followed. My purpose here is not to outline the steps in the scientific method, but to point out generally its relation to the practice of occupational therapy. The scientific method is one way in which to obtain knowledge; however, knowledge may also be obtained through art.

Examples of the use of science in the practice of occupational therapy are listed below.

**Many treatment techniques used in occupational therapy are based on science.** Rood's technique of facilitating the functioning of the parasympathetic nervous system by exerting pressure in the sino-aortic area or stimulating the sinus nerve is one example of treatment techniques based on a scientific principle (see Gellhorn, 1943). Ayres submitted much of her sensory integration treatment to scientific examination to ascertain which children were the most appropriate candidates for such treatment (Ayres, 1972b, 1976). As Kimball points out in her article in this issue, with the development of the SIPT as a more sensitive instrument by which to identify more discrete categories of
sensory integrative functioning, studies may now determine with even greater precision which children will benefit most from sensory integration treatment.

**Occupational therapists now have access to more scientifically based assessment instruments used as both screening and evaluation tools.** Pediatric occupational therapists have access to a greater number of scientifically based tests than do therapists in other specialties. The Bayley Scales of Infant Development (Bayley, 1969) has served as an evaluation tool with a sound scientific basis, the Neonatal Behavioral Assessment Scale (Brizelton, 1984) is in the process of being standardized, and the Miller Assessment for Preschoolers (Miller, 1982) has added to the profession’s repertoire of scientifically developed instruments. With the addition of the rigorously developed SIPT, occupational therapists now have a more scientifically based group of tests with which to measure sensory integrative functioning. Mailloux, in this issue’s lead article, provides a clear summary of the complicated scientific processes that were followed to ensure that the SIPT had a strong scientific base. Three other articles in this issue discuss aspects of the SIPT as an instrument: (a) McAtee and Mack examine an aspect of the SIPT’s validity by examining the relation between scores on the Design Copying subtest and scores on the Southern California Sensory Integration Tests (Ayres, 1980), (b) Kimball discusses the ability of the SIPT to measure change, and (c) Wallace and I discuss the effect of socioeconomic status on children’s performance on the praxis subtests. These three studies examine properties of the SIPT not addressed previously.

**Rigorously developed tests, such as the SIPT, are used not only to obtain knowledge about individual patients but also to scientifically obtain greater knowledge about normal and dysfunctional development.** In this issue, Murray, Cermak, and O’Brien compare perception in non-learning-disabled and learning-disabled children and provide additional knowledge about sensory processing in these populations, and Fanchiang, Snyder, Zobel-Lachiusa, Bartolo Loeffler, and Thompson use the SIPT to obtain knowledge about a population of delinquent-prone adolescents, who are often treated by psychosocial occupational therapists, although little is known about their sensory processing. Cermak, Morris, and Koomar, also in this issue, use one of the praxis subtests of the SIPT to obtain scientifically based knowledge about the development of visual and auditory processing in children.

**Questioning is an important process of science.** The extent to which an aspect of practice is scientifically based is sometimes debated among occupational therapists and among other professionals as well. History shows us that upon their introduction, most important and revolutionary theories in human knowledge were debated, at least within their contemporary intellectual communities. One might even consider that if a theory or scientific work is not hotly debated and criticized it probably is not very new or revolutionary. From the beginning, Ayres’s work, including her tests for the identification of sensory integration dysfunction and her theories, have been accepted by some and questioned by others, thereby resulting in an endless debate both within and outside of the field of occupational therapy. For example, Cohen (1989) questioned the validity of using the Southern California Postrotary Nystagmus Test (Ayres, 1975) to measure vestibular function. Especially appropriate to this issue of the journal, Wiss and Clark’s The Issue Is article provides a rebuttal to Cohen’s objection. Occupational therapy is now developing sufficiently as a profession that we are better able to view questions not as threats but as challenges that provide an opportunity for us to organize and articulate our thoughts. Questions, whether from those who agree or those who disagree with us, often motivate us to find more scientifically based answers. Had Ayres’s ideas not been questioned by herself, by her colleagues, and by others, both within and outside of the field of occupational therapy, perhaps there would not be such efforts, some of which are represented in this issue, to demonstrate the scientific basis of her work.

**Relation of Art and Science**

Considering the above examples of art and science, one can see how they become intertwined in practice. For example, the certification process for the SIPT allows the therapist to develop skill in administering the 17 subtests of the SIPT; however, the therapist is learning to use a scientifically based instrument. When writing a report on the child’s performance on the SIPT, the therapist uses the results that are based on information obtained during a rigorous scientific standardization process and the computer scoring provided by Western Psychological Services (examples of these score sheets are shown in Tupper’s and Stallings-Sahler’s articles in this issue). Those tools provide a greater scientific basis for the therapist’s judgments, which exemplifies the use of art. To differentiate what is art from what is science in a practice, one must carefully unravel the two elements.

**Knowledge is a part of the definition of art, that is, technical knowledge or skill in performance. Knowledge, therefore, is a part of both art and science.** The difference lies in the methods used to attain or to develop that knowledge. Both scientific and artistic methods can be used to obtain knowledge. Therapists are using the scientific method when they conduct research and the artistic method when they practice administering an evaluation tool or observing people clinically to obtain knowledge about their performance. The therapist often gains initial knowledge on a particular topic through artful clinical observations of patients, which leads to hypothesizing about development and building theories, which may then be submitted to scientific inquiry for verification.

**Knowledge Transfer**

If a therapist, through either an art or science, has gained knowledge in practice about normal development and wants to transfer this knowledge to others, he or she has two ways to transfer this information: privately or publicly. Knowledge transferred privately is referred to as private knowledge, that which is transferred publicly, public knowledge. Both public...
and private knowledge may be obtained through either art or science, thus forming a 2x2 matrix yielding four possible combinations. Knowledge gained through art may be transferred either privately or publicly, and knowledge gained through science may be transferred either privately or publicly.

Public Knowledge

Public knowledge is information that is accessible to anyone, that is, is published and indexed in some way as to be retrievable by anyone capable of using indexing systems. For example, if an article is published in a journal and indexed in one of the indexes or computer retrieval systems, someone interested in that topic can find it using the index.

**Public knowledge and science.** Ayres and Maillyoux (1981) studied the effects of sensory integration procedures on language development using scientific methods and published an article on their findings. Their article is an example of science that is transferred publicly. The study is indexed and accessible to anyone who is capable of conducting a computer or manual search.

**Public knowledge and art.** A clinician who has made clinical observations about the behavior of a specific patient population and has included these observations in a published work provides us with an example of art transferred publicly. Ayres’s (1972a) description of the prone extension position of a nondysfunctional child and discussion of the ways learning-disabled children deviate from that position is an example of public knowledge gained through art. Ayres transferred some aspects of her theoretical concepts and several treatment techniques privately, directly to a student or a colleague. Unless one studied under Ayres or under one of Ayres’s students, the information was not available and remains private knowledge.

Private Knowledge

Private knowledge is information that is not accessible to everyone. To obtain such information, one must be in a particular place at a particular time. For example, if an instructor provides an example to a class from his or her clinical experience and the general public cannot access this information through an indexing system, then the instructor is transferring information in a private way, that is, the information is private knowledge. If the instructor interprets a journal article or a patient’s behavior in a way that is not available in a textbook or article, for example, then he or she is providing the class with private information.

Private knowledge is information that is passed from one person to another person or group.

Private knowledge can be on any subject; its main characteristic is that it is not accessible to everyone. Additionally, although an occasion such as a conference or workshop may be a public event, the knowledge shared through that means may still be private knowledge. For example, most information presented at conferences and workshops is not published or available through an indexing system and thus is transferred privately, not publicly.

**Private knowledge and science.** Suppose someone conducts a research project but does not publish the study, which does occur occasionally. The researcher might discuss this study and present the results at a meeting or a conference, but never publish the results. Therefore, the only way in which one could know about the study, which is scientifically based, is to have been at the presentation.

**Private knowledge and art.** If a clinician teaches an occupational therapy intern unpublished treatment techniques that he or she has devised or learned from another therapist, then the clinician is privately transferring knowledge related to clinical skills.

Conclusion

Until recently, the field of occupational therapy has relied primarily on private knowledge to educate occupational therapy students and to evaluate and treat patients. To learn about occupational therapy, for example, one had to attend occupational therapy classes and obtain information that was verbally passed from teacher to student; the information was not available elsewhere. Such knowledge was often based on art, that is, a treatment technique that the teacher had devised or a motor deficit that the therapist had observed in a specific population. Because occupational therapists continue to rely heavily on private knowledge, persons outside our profession do not know what we do, and practitioners often express concern that other professionals do not understand us and the importance of our work. Perhaps this is a result of our not having provided public knowledge about what we do. Professionals outside of the field of occupational therapy, therefore, have had difficulty understanding the province of our field because such knowledge has been transferred privately and has come through art rather than science.

Each cell in the matrix of practice has advantages and disadvantages. Public knowledge that is scientifically based is time consuming and costly; it also requires that a therapist develop skill in reading and understanding scientific material. Such knowledge may not be available to rural therapists who do not have access to large libraries. It is also usually more abstract than knowledge transferred privately and can be more difficult to incorporate into clinical practice. Public knowledge, whether based on art or science, is more efficiently transferred, however, because a larger audience can be reached.

Furthermore, scientifically based public knowledge has the greatest credibility to others. Conversely, privately transferred knowledge gained through art is inefficient and time consuming because it must often be repeated if a large audience is to be reached. It is also the least credible source of information. Learning by observing or listening to others, however, is often easier than learning through the printed word, and information gained privately is often more readily incorporated into practice. Another advantage of private knowledge gained through art, and a significant function of practice as well, is that it provides the therapist with an opportunity to explore relations, consider alternatives, and synthesize information, which can help him or her to develop a personal frame of reference and can lead to theory building (Reed, 1984).
Knowledge transferred publicly lasts longer. Although Rood (1952, 1954, 1956, 1969) based her treatment techniques on scientific knowledge that was publicly available, she herself rarely transferred knowledge of her treatment techniques publicly, so most of them remain private knowledge. Unfortunately, since her death, much of her work has been lost to the field. Rood’s legacy is fast becoming lost, thus exemplifying the importance of transferring knowledge publicly.

Ayes left a legacy of knowledge gained from art and science and transferred much of it to others, both privately and publicly. Her legacy exemplifies the incorporation of all four processes represented in the matrix. Let us continue the example set by Ayes by knowing the differences between art and science and private and public knowledge, by understanding the role of each, and by representing each in our practice so as to make our practice more effective and, ultimately, our profession stronger.

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References


