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Understanding Ayres Sensory Integration®

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ABSTRACT
Occupational therapists and occupational therapy assistants rely on knowledge and skills to guide their intervention planning as they help clients who are experiencing difficulties with engaging in occupation. Sensory integration theory, with its rich history grounded in the science of human growth and development, offers occupational therapy practitioners specific intervention strategies to remediate the underlying sensory issues that affect functional performance.

This article articulates the core principles of sensory integration as originally developed by Dr. A. Jean Ayres, explains the rationale for developing a trademark specifically linked to these core principles, and identifies the impact that this trademark can have on practice.

LEARNING OBJECTIVES
After reading this article, you should be able to:
1. Recognize why the term *Ayres Sensory Integration®* was trademarked.
2. Identify the core concepts of Ayres Sensory Integration in relation to typical development, patterns of sensory integration dysfunction, and principles of intervention.
3. Differentiate Ayres Sensory Integration from other approaches that use similar terms and strategies but do not include the same theoretical principles of this approach.

INTRODUCTION
Biologist Edward Wilson (1998) stated that "scientific theories are the product of imagination—*informed imagination.* They reach beyond their grasp to predict the existence of previously unsuspected phenomena" (p. 57). Sensory integration theory, originated by A. Jean Ayres, fits this description because many aspects of her work represent concepts that require a great deal of imagination about previously unsuspected phenomena. Generated by an occupational therapist and developed primarily within the profession of occupational therapy, sensory integration theory and its application provide an important set of knowledge and skills for practitioners world-wide. Sensory integration is also one of the first theories generated within occupational therapy to undergo the rigor of providing evidence that validates its constructs while providing direction for the strategies clinicians use to remediate the underlying sensory issues that affect performance.

Since Ayres's early writings, beginning in the 1950s, many publications have contributed to the evolution of this theory, which is one of the most cited and applied of all theories within occupational therapy (Mulligan, 2002). As greater interest has developed in the role of brain function in behavior and learning, increased attention has been directed toward Ayres's work. The result has been increased appreciation of the eloquence and substance of her research, as well as controversy related to documentation of the efficacy of some aspects of this approach. Part of the controversy stems from the many publications and intervention programs that do not truly reflect the principles of Ayres's work but that have nonetheless been mistakenly associated with sensory integration (Parham, Cohn, et al., 2007). In an effort to clarify the concepts that do reflect Ayres's sensory integration framework and to preserve the integrity of this work within occupational therapy, the Baker/Ayres Trust trademarked the term *Ayres Sensory Integration®*. This article presents the rationale for establishing a trademark for this term, identifies the core concepts of Ayres Sensory Integration, and discusses the implications of this trademark for occupational therapy practitioners.

This article does not evaluate the validity or usefulness of other sensory-based theories, diagnostic terms, or interven-

tions within or outside of occupational therapy. The terminology used in this article is consistent with that used by Ayres. Many terms have multiple meanings, such as *sensory integration* as a theory and frame of reference, and as a process related to multimodal processing that supports the formation and retrieval of multisensory perceptions in the central nervous system. *Sensory processing* is a generic term used to describe the way in which sensation is detected, transduced, and transmitted through the nervous system. *Sensory processing deficits,* therefore, can be used to describe any of the ways in which the above is flawed. *Sensory integrative deficits,* as used within occupational therapy, have been defined through many years of factor and cluster analyses, including confirmatory analyses, and may be identified through the use of standardized assessments, skilled observations, and parent and teacher report. *Sensory-based strategies* may or may not include those that are considered part of Ayres Sensory Integration. The varying ways in which these terms overlap and are used in practice may be confusing. Therefore, when using these terms and evaluating a client's abilities or a practitioner's focus during intervention, it is important as therapists and consumers to understand the research underlying the identification of a certain type of sensory problem and the sensory-based methods used during intervention.

RATIONALE FOR ESTABLISHING A TRADEMARK FOR THE TERM *AYRES SENSORY INTEGRATION®*

A review of the use of the term *sensory integration* yields a concerning number of references to sensory integration that involve methods void of key occupational therapy principles, such as promoting an adaptive response and engagement in occupation (Glennon & Smith Roley, 2006, 2007; Smith Roley & Glennon, 2006). In recent years, a proliferation of sensory stimulation treatment centers have typically involved passive visual, auditory, and movement sensations (e.g., www.sensorylearning.com, www.sensorycenter.com, www.neurosensorycenter.com, www.sirri.com), which often are provided by individuals who are not occupational therapists and whose professional credentials are sometimes difficult to discern. Several therapists from outside the United States also have reported concerns about other professions, such as physical education and psychology, whose members claim sensory integration as a psychoeducational tool while also demonstrating some efforts to limit occupational therapy's involvement in the assessment and intervention of children with sensory integration deficits. Lastly, it has become common for sensory activities to be proposed as rewards for appropriate behavior or performance during discrete trial training for children with autism and sensory integration, which is often misunderstood or misrepresented within these communities (e.g., www.autism-society.org/site/PageServer?pagename=about_treatment_learning#SensoryIntegration).

The Baker/Ayres Trust shared the professional concerns regarding confusion around sensory integration theory and established a trademark for the term *Ayres Sensory Integration®*.

CORE CONCEPTS IN AYRES SENSORY INTEGRATION

Bundy, Lane, and Murray (2002) noted that sensory integration theory is used to explain behavior, plan intervention, and predict how behavior will change through intervention. They identified the three main components of sensory integration theory as describing typical sensory integration development, defining sensory integrative dysfunction, and guiding intervention programs. A clear and comprehensive understanding of these three aspects of Ayres Sensory Integration will assist occupational therapy professionals in appropriate and effective application of this approach.

TYPICAL SENSORY INTEGRATION FUNCTIONING

Ayres built sensory integration theory on her understanding of neurobiology. Before the publication of her classic book, *Sensory Integration and Learning Disorders* (Ayres, 1972b), she published numerous essays on her theories, setting forth the key components of the relationship between sensory integration and performance through her analysis of existing research. These principles informed her work in test development and later research that defined various types of sensory integration deficits and the related deficits in motor learning, academic abilities, attention, and behavior.

In 1960, Ayres challenged the principles of "purposeful activity" that focused on exercising a component of a motor pattern, proposing that "1) learning takes place as a function of reward or reinforcement, 2) one learns what he does, and 3) learning takes place because there is a purpose for its taking place" (Ayres, 1960, p. 38). She believed that a person must perceive the goal and process of the intervention in order to benefit from it, highlighting the perceptual awareness of occupational engagement.

Drawing on motor control theories, Ayres (1960) proposed that motor learning follows inherent maturational sequences and is influenced by, if not dependent on, incoming sensation. In 1961, Ayres proposed that the development of the body scheme in children created a postural model to understand visual-motor development, and she proposed that the ability to sit up and sit still required perceptual support from the vestibular and proprioceptive systems in addition to the neuromotor systems, thus highlighting postural control as an essential foundation for more skilled academic and motor performance. She further posited that the tactile, vestibular, proprioceptive, and visual systems provided key data in the development of reading and writing and may be impaired in children with learning disabilities. Ayres's early references to what is now commonly called sensory modulation began in 1964. Ayres (1964) informed readers of the

importance of tactile functions, and she proposed that the ability to focus and maintain attention and to keep a steady level of activity were related to the way in which the nervous system responds to tactile and other sensations.

In 1972, Ayres wrote about one of the most important features of her theory: the aspect of sensory integration itself. She proposed that sensory systems do not develop independently of one another; rather, visual and auditory processing depends on the foundational body-centered senses (Ayres, 1972a, 1972b, 1972c, 1972d). According to Ayres, sensory information is not processed in isolation and, given this essential feature of the central nervous system, therapeutic intervention that incorporates sensation to affect multisensory perception will influence learning and behavior. Ayres (1961) proposed that through the development of these sensorimotor functions and, specifically, by facilitating adaptive somatomotor responses, a person can develop improved learning, reading, math, visual and auditory perception, and skilled motor tasks. Bundy et al. (2002) stated this postulate of sensory integration theory as follows: "Learning is dependent on the ability to take and process sensation from movement and the environment and use it to plan and organize behavior" (p. 5).

The hypotheses that Ayres proposed continue to reflect forward thinking about brain function and learning and behavior, such as:

- Perceptual awareness supports and facilitates occupational engagement.
- Motor learning is influenced by, if not dependent on, incoming sensation.
- Body awareness creates a postural model to understand visual-motor development.
- Postural control is essential for skilled academic and motor performance.
- Tactile, vestibular, proprioceptive, and visual systems provide key data in the development of reading and writing.
- The ability to focus and maintain attention and to keep a steady level of activity, and the way in which the nervous system responds to tactile sensation, are related.
- The sensory systems develop in an integrated and dependent manner.
- Visual and auditory processing depend on foundational body-centered senses.

SENSORY INTEGRATIVE DYSFUNCTION

With a systematic and comprehensive research program unique within the field of occupational therapy at the time, Ayres tested the hypotheses she developed based on her study of neurobiological function and childhood occupation. Kielhofner (2005) noted, Ayres was a "notable exception" as an occupational therapist who "remained a practitioner while creating theory and conducting research" (p. 232). This combination of scientific inquiry alongside clinical observation and experience guided her study of the challenges children with learning and behavioral concerns face.

Through the use of a series of factor analyses with standardized measures of sensory discrimination, sensory responsivity, fine and gross motor skills, and praxis, Ayres developed sensory integration theory and identified patterns of function and dysfunction. She proposed that these factor analyses would help to discover relationships among the different kinds of sensory perception, motor activity, laterality, and selected areas of cognitive function. She analyzed literature that included children with perceptual deficits, motor deficits, cognitive deficits, and sensory loss and hypothesized that although multisensory perceptual and motor deficits may affect these persons, it was possible that a child could show impairment in one area and not the other (Ayres, 1965). Indeed, Ayres found that this was the case. Beginning with factor analyses on the Southern California Sensory Integration Tests (SCSIT; Ayres, 1972c) and later with the Sensory Integration and Praxis Tests (SIPT; Ayres, 1989), Ayres confirmed the relationships between sensory and motor functions in children who were typically developing and showed that perceptual deficits were found in children with an array of symptoms or syndromes in different ways from those seen in the general (normal random sample) population.

Beginning in 1965, and until her last paper published in 1989 shortly after her death, Ayres documented the presence of patterns of sensory integration dysfunction that included (a) developmental dyspraxia, distinguished by a link between motor planning and tactile perception; (b) visual perception, form and space perception, and visual-motor functions; (c) tactile defensiveness linked with hyperactive-distractible behaviors; (d) vestibular and postural deficits, including integration of two sides of the body, right–left discrimination, midline crossing, and bilateral motor coordination; (e) deficits in visual figure ground discrimination; and (f) deficits in auditory and language functions.

Over this 24-year period, repeated factor analyses showed similar patterns of deficits with different samples of children. These repeated analyses provided the construct-related evidence that sensory integrative deficits exist as reproducible patterns. Ayres completed numerous unpublished factor analyses in addition to those that were published (Ayres, 1989; see also Parham & Mailloux, 2005). Early analyses included as many as 35 other perceptual and motor measures, cognitive tests, auditory processing measures, behavioral measures, and clinical observations of neuromotor functions. The SIPT, a revised and new set of tests that replaced the earlier SCSIT, provided the opportunity for an expansion of tests normed on a large national sample. (The SIPT allows the therapist within a 2-hour testing period the opportunity to objectively sample multiple areas of performance, such as visual perception; visual-motor skills; visual construction;

tactile discrimination; tactile defensiveness; kinesthesia; vestibular-ocular nystagmus; balance; bilateral motor control; sequencing; several types of praxis, such as sequencing; imitation of body gestures and oral-motor gestures; and following verbal commands. The SIPT provides standard scores for children between 4 years and 8 years 11 months of age.)

In 1998, Mulligan embarked on a monumental study that used more than 10,000 sets of data, each representing an individual child. She performed confirmatory and exploratory factor analyses and found similar patterns of deficits with her data as Ayres did. Mulligan also found a commonality between the individual patterns she identified as bilateral integration and sequencing, somatopraxis, visuopraxis, somatosensory, and postural-ocular movements. Ayres originally called this commonality "generalized praxis dysfunction" and subsequently called it "general sensory integration dysfunction" (Ayres, 1989, p. 176).

Ayres, and later Mulligan, also performed cluster analyses. Ayres's (1989) study using the SIPT yielded four dysfunctional groups, namely, low-average bilateral integration and sequencing, visual and somatodyspraxis, dyspraxia on verbal command, and generalized sensory integrative dysfunction. Mulligan's groups were generalized sensory integration dysfunction and dyspraxia—severe; dyspraxia; generalized sensory integration dysfunction and dyspraxia—moderate; and low-average bilateral integration and sequencing.

The extensive research Ayres conducted and Mulligan reinforced formed the basis for identifying patterns of sensory integrative dysfunction with new information and related research now contributing to the refinement and further understanding of these types of dysfunction. Some of the ways in which the factor analyses moved the theory of sensory integration along are as follows:

- Tactile perception is linked to praxis (Ayres, 1965, 1966a, 1966b, 1971; Ayres, Mailloux, & Wendler, 1987).
- Tactile defensiveness is linked to hyperactivity rather than to tactile perception (Ayres, 1965, 1966a, 1966b, 1969, 1972d).
- Most children show more than one factor, demonstrating relationships among factors, and less variation in patterns is seen in children who are typically developing (Ayres, 1965, 1966a, 1966b, 1989; Ayres et al., 1987).
- Introduction of a measure of postrotary nystagmus test clarifies the role of vestibular system with postural and bilateral pattern (Ayres, 1975).
- Inclusion of auditory language measures suggest left hemisphere versus sensory integrative dysfunction (Ayres, 1969, 1971, 1972d, 1977).
- Sensory integrative patterns are not along sensory systems (Ayres, 1965, 1966a, 1966b, 1971, 1972A, B, D; 1977, 1989; Ayres et al., 1987).

PRINCIPLES GUIDING INTERVENTION PROGRAMS

According to Spitzer and Smith Roley (2001), "Intervention emphasizing a sensory integration approach addresses the sensory needs of the child in order for the child to make adaptive and organized responses to a variety of circumstances and environments" (p. 17). It is best distinguished by the active engagement of the child who is allowed to move, jump, swing, and crash. Additionally the child is encouraged to move and change the environment to create higher and more challenging demands for perceptual-motor integration. The hallmark of sensory integration is that it is done in the context of play, the children love the activities, and the activities are their own reward.

Ayres structured her intervention approach using sensory integration theory around principles of motor learning, the adaptive response, and purposeful activity.

The following principles are deemed essential to the delivery of intervention using a sensory integration approach (Parham, Cohn, et al., 2007):

- Intervention is delivered by a qualified professional—occupational therapist or occupational therapy assistant under the direct supervision of the occupational therapist, physical therapist, or speech-language pathologist.
- The intervention plan is family centered and based on a complete evaluation and interpretation of the patterns of sensory integrative dysfunction in collaboration with significant persons in the client's life and with adherence to ethical and professional standards of practice.
- Therapy takes place in a safe environment that includes equipment that will provide vestibular, proprioceptive, and tactile sensations and opportunities for praxis.
- Activities are rich in sensation (especially vestibular, tactile, and proprioceptive sensation), and offer opportunities for integrating that information with other sensations, such as visual and auditory.
- Activities promote regulation of affect and alertness and provide the basis for attending to salient learning opportunities.
- Activities promote optimal postural control in the body, oral-motor, ocular-motor areas, and bilateral motor control, including maintaining control while moving through space and adjusting posture in response to changes in the center of gravity.
- Activities promote praxis, including organization of activities and self in time and space.
- Intervention strategies provide the "just-right challenge."
- Opportunities exist for the client to make adaptive responses to changing and increasingly complex environmental demands. Highlighted in Ayres Sensory Integration intervention principles is the "somatomotor adaptive response," which means that the person is adaptive with the whole body, moving and interacting with people and things in the three-dimensional space.
- Intrinsic motivation and drive are used to interact through pleasurable activities; in other words, play.

- The therapist engenders an atmosphere of trust and respect through contingent interactions with the client. The activities are negotiated, not preplanned, and the therapist is responsive to altering the task, interaction, and environment based on the client's responses.
- The activities are their own reward, and the therapist ensures the client's success in whatever activities are attempted by altering the activities to meet the client's abilities.

Although more than 80 studies have been published on evidence in the effectiveness of sensory integration methods, many have methodological flaws (Miller, 2003; Parham, Cohn, et al., 2007). Most do not report fidelity, and those that do have minimally adhered to the fidelity principles that *define* Ayres Sensory Integration. Clearly, further research is needed.

The intervention principles of Ayres Sensory Integration highlighted through the fidelity work not only demonstrate how this approach differs from the sensory stimulation protocols, but also reflect the many ways in which this approach is occupation based. Cohn's (2001a) work on parental perspectives of sensory integration revealed that parents' overarching concerns for their children with sensory integrative disorders were related to social participation. Through interviews, parents reported that they valued their children's improved ability to engage in activities as being important in relation to the children's sense of self-worth. In related work, Cohn (2001b) also reported on the ways in which the family-centered nature of the sensory integration approach affects engagement and participation for parents as well as for the child in treatment.

CLARIFYING AYRES SENSORY INTEGRATION IN RELATION TO SENSORY-RELATED TERMS AND APPROACHES

With increased attention on the role of sensation in development, learning, and behavior, many usages and applications of terms that share some similarity with those associated with Ayres Sensory Integration now exist. The surge in the diagnosis of autism (Centers for Disease Control and Prevention, 2007), along with the prevalence of sensory-related symptoms in this disorder, also have had the effect of increasing attention toward and variation in application of terminology. The overlap of terminology creates the potential for confusion and lack of clarity in an area that requires thoughtful distinction for professionals internal and external to occupational therapy as well as for consumers. Two areas in which terminology confusion is evident relate to the "types or patterns of dysfunction" and "intervention approaches."

In relation to the terms used for the type or patterns of sensory integration deficits, some of the variations have occurred as research has contributed new and refining information. This type of change in terminology is clearly documented through Ayres's and Mulligan's factor analytic studies as well as through other studies of sensory integration function and dysfunction. As the concepts that have emanated from Ayres Sensory Integration continue to evolve, some work likely will expand and add to Ayres's original work, whereas other concepts may eventually lead to different perspectives or frameworks. For example, research in the area of sensory modulation in recent years (Dunn, 1999; May-Benson & Koomar, 2007; Miller, Anzalone, Lane, Cermak, & Osten, 2007; Miller-Kuhaneck, Henry, & Glennon, 2007; Parham, Cohn, et al., 2007; Parham, Ecker, Miller-Kuhaneck, Henry, & Glennon, 2007; Schaaf, Miller, Seawall, & O'Keefe, 2003) has clearly expanded the original factor analysis findings from Ayres on tactile defensiveness and on her clinical descriptions of gravitational insecurity. In another example, however, the explanation for other variations in terminology about the type of dysfunction is sometimes less clear. In a series dedicated to sensory integration terminology in the year 2000 *Sensory Integration Special Interest Section Quarterly* newsletters (Hanft, Miller, & Lane, 2000; Lane, Miller, & Hanft, 2000; May-Benson, Reeves, & Young, 2000; Miller & Lane, 2000), terms such as *dysfunction in sensory integration* and *dysfunction in sensory modulation* were suggested as preferable over the term *disorder* (Lane et al., 2000). However, more recently some of the same authors began to use the term *disorder* instead of *dysfunction* (Miller et al., 2007). Although this shift in terminology may be related to efforts to submit some aspects of sensory integration problems to a categorization system (i.e., the *Diagnostic and Statistical Manual*), the clinical reason for the suggested change to *disorder* from *dysfunction* is unclear to practitioners, particularly because previous occupational therapy publications suggested not using this term.

In addition, the same authors (Miller et al., 2007) have now suggested using *sensory processing* instead of *sensory integration* for the patterns of deficit. One of the reasons the authors seem to suggest for changing from *sensory integration* to *sensory processing* is that they believe the term for a disorder needs to be differentiated from the term for the theory and intervention. However, Ayres and other researchers in sensory integration have already assigned more specific terms to disorder patterns (e.g., *bilateral integration and sequencing deficit* [Ayres, 1989]) to accomplish this differentiation. Another rationale given for using *sensory processing* versus *sensory integration* is that

> use of the term sensory integration…is often interpreted differently within and outside the field of occupational therapy. (For example, use of the term sensory integration often applies to a neurophysiologic cellular process rather than a behavioral response to sensory input as connoted by Ayres.) (Miller et al., 2007, p. 136)

This rationale is equally confusing, however, because the term *sensory processing* also is used extensively outside of occupational therapy in neurophysiologic cellular applications.

A search of the two terms in PubMed (July 12, 2007) yielded 7,521 citations for *sensory processing* and 2,304 citations for *sensory integration,* with almost all of the entries for both terms citing research that does not apply to either term in ways occupational therapists use. Thus, one must question whether this reasoning supports a change in terminology from *sensory integration* to *sensory processing.*

Intervention approaches represent another area that calls for thoughtfulness in the use of terminology. Ayres developed her theory of sensory integration at a time when several educators and psychologists were studying and developing programs often referred to by such terms as *perceptual-motor, sensorimotor,* or *visual-motor approaches* (Frostig & Horne, 1964; Kephart, 1960). These perceptual-motor and sensorimotor approaches tend to focus primarily on visual and sometimes auditory perception but did not prioritize the primary sensations of the tactile, proprioceptive, and vestibular sensory systems, as does Ayres Sensory Integration. Finally, praxis or "motor planning" is highlighted in Ayres Sensory Integration versus the emphasis on specific motor *skills*, such as eye–hand coordination as seen in the perceptual programs.

Occupational therapists also have developed, and practitioners commonly use, a variety of approaches that incorporate sensation or complement sensory-based strategies (Bundy et al., 2002). For example, the Alert Program for Self-Regulation is a complementary approach that encourages cognitive awareness of alertness often with the use of sensory strategies to support learning and behavior (Williams & Shellenberger, 1994). Other approaches primarily use passive sensory experiences or sensory stimulation based on specific protocols, such as the Wilbarger Approach (Wilbarger & Wilbarger, 2002) and the Vestibular-Oculomotor Protocol (Kawar, 2002). Although these techniques include sensation and may eventually demonstrate evidence of effectiveness if they are researched in the future, they are not consistent with the principles of Ayres Sensory Integration and, thus, represent a different model.

The attempt to bring uniformity to the use of terms has opened dialogue but has not necessarily led to clarity or consensus. As the professional dialogue continues, it is important for the occupational therapy community to be aware that the terms Ayres applied as part of Ayres Sensory Integration were chosen carefully based on theory and research. Acquiring a clear understanding of the core principles of Ayres Sensory Integration as well as other theories and frames of reference allows occupational therapists and occupational therapy assistants to identify the supporting literature to enhance their evidence-based practice and clearly articulate to consumers which principles they are implementing.

CONCLUSION

Ayres Sensory Integration encompasses a core theoretical framework developed by one of the first occupational therapists to develop and implement a program in research. Based on a long and rich history of theory formulation, test development, hypothesis testing, and clinical practice, sensory integration represents one of the most impressive accomplishments to emanate out of occupational therapy. The trademark of this term is intended to protect and preserve this important work so that it can continue to evolve and grow in ways that Ayres intended. In 1963, Ayres wrote, "Twenty-five years from now a neurophysiological approach to the treatment of patients with motor problems is going to be quite well developed, fairly well accepted and we are going to look back with respect and gratitude to those people who helped start it" (Ayres, 1974, p. 63). Now more than 25 years later, we indeed write this article with respect and gratitude for the work of Ayres and all those who have contributed to our understanding of the contributions of sensation to learning, development, and participation in daily activities. ■

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Understanding Ayres Sensory Integration®
September 24, 2007

Learning Level: Intermediate
Target audience: Occupational therapists and occupational therapy assistants
Content Focus: Category 1, Domain of OT, Evaluation and Intervention; Category 2, Client Factors

1. Which of the following incentives resulted in the trademark Ayres Sensory Integration®?
   A. Reduce confusion regarding the core principles of Ayres's approach
   B. Distinguish features unique to Ayres Sensory Integration
   C. Clarify Ayres Sensory Integration as active, child directed, and playful
   D. All of the above

2. Which of the following would be considered an Ayres Sensory Integration intervention?
   A. Lying on a table that moves and rotates while listening to music through headphones
   B. Sitting at a desk imitating the therapist in creating Theraputty designs
   C. Performing collaboratively created activities adjusted to promote the child's success
   D. Receiving a sensory diet, created by a therapist, provided at specific times each day

3. Ayres Sensory Integration intervention may be provided by which of the following professionals?
   A. Physical therapists
   B. Speech-language pathologists
   C. Occupational therapists
   D. All of the above if properly qualified

4. Which of the following is *not* a core feature of Ayres Sensory Integration?
   A. Child-directed activities
   B. Passively applied sensory stimulation
   C. Play
   D. Collaboration between client and therapist

5. Ayres's work included which of the following?
   A. Theory
   B. Standardized assessments and nonstandardized observations
   C. Patterns of dysfunction that helped guide intervention
   D. All of the above

6. Which of the following is *false* regarding Ayres Sensory Integration?
   A. Research in basic science supports Ayres's original hypotheses
   B. Research using factor analysis supports the patterns of sensory dysfunction
   C. Research does not exist regarding the effectiveness of sensory integration
   D. Research from basic and applied science supports the use of sensory integration in practice

7. Which of the following separates Ayres Sensory Integration methods from other interventions?
   A. Contingent responses of the child guiding the moment-by-moment choice of activities
   B. The use of visual and auditory strategies
   C. The therapist's choice of activities
   D. Reliance on appropriate evaluation data

8. The trademark of Ayres Sensory Integration is used in which of the following ways?
   A. To restrict its use by the therapy community
   B. To protect sensory integration theory and practice as used within occupational therapy
   C. To promote sensory integration equipment
   D. To include widely used intervention methods that are called sensory integration

9. The fidelity to treatment measure was originally designed for
   A. Research
   B. Education
   C. Consumers
   D. Legal purposes

10. Ayres Sensory Integration trademark is owned by
    A. Occupational therapists
    B. The Baker/Ayres Trust
    C. The American Occupational Therapy Association
    D. Consumer groups

11. Sensory integration dysfunction includes:
    A. Praxis deficits
    B. Tactile, visual, vestibular, and proprioceptive-based disorders
    C. Postural and bilateral coordination problems
    D. All of the above

12. Ayres Sensory Integration
    A. Can be combined with other frames of reference in occupational therapy
    B. Has limited evidence on the various patterns of sensory integration dysfunction
    C. Highlights the use of olfactory and auditory stimuli to support development
    D. Does not address postural and coordination problems