CASE REPORT

Report of an Occupational Therapy Evaluation of Sensory Integration and Praxis

Susan Stallings-Sahler

Key Words: assessment process, occupational therapy • occupational therapy services • pediatrics • tests, by title, Sensory Integration and Praxis Tests

This case study of an evaluation with the Sensory Integration and Praxis Tests (SIPT) (Ayres, 1989) is one example of a style that therapists may use when writing a report. Although some clinicians disagree on the extent to which neurological interpretation should be expounded in such a report, we must take into account the context in which the document was written.

Although an SIPT evaluation written for use in an educational environment should not include extensive explanations of possible central nervous system issues, such explanations are often necessary when the clinical context is more medical (e.g., in a hospital or private practice environment). This is particularly true when a health insurance payer is involved. The evolving trend among insurance companies is to refuse payment if the child’s dysfunction can be construed as “just a learning disability,” because then it is considered to be an educational problem, not a health problem. In the following report, the parents of the child in question were being refused insurance payment for occupational therapy services because the insurer classified the child’s problems as a learning disorder.

Case Study

Gregory, aged 4 years 4 months, was initially referred for an occupational therapy evaluation because of feeding problems, difficulty with motor coordination in performing basic self-care tasks, extreme negative reactions to touch, and problems with balance involving delayed equilibrium reactions.

History

Gregory’s parents reported no unusual or problematic prenatal or perinatal circumstances. They did report, however, that at a very early age, Gregory had displayed problem behaviors, such as not wanting to be touched, exhibiting a higher-than-normal activity level, and having labile emotional outbursts of no known psychogenic origin. He had difficulty handling eating utensils, crayons, and other toys and age-appropriate tools. His parents had also observed some behavioral reactions to certain foods, but clinical tests showed only a weak or no corroborative evidence.

Assessment

I used the SIPT to evaluate Gregory. This test assesses aspects of sensory processing and neuropsychological mechanisms underlying learning, language, and behavior. It also measures praxis, or the ability to conceptualize, plan, and execute skilled movement, such as that required for tool use, object manipulation, constructional tasks, arranging of the environment, and other occupational behaviors associated with...
cluded within each test report returned by Western Psychological Services.

Besides the standardized test scores, clinical observations were made of the child's hand-eye preference, ocular pursuits, postural and reflex mechanisms, and other sensorimotor functions related to learning and behavior.

Gregory had difficulty accepting that he had to participate in the evaluation tasks rather than in his usual therapy activities. His attention fluctuated, depending on the type of testing being performed. On tests of motor-free visual perception, his attention was excellent, but on tests requiring motor control and coordination, his frustration with the tasks increased. He became extremely angry during the Bilateral Motor Coordination and Standing and Walking Balance subtests, exclaiming on the latter, "I hate this floor!" when he experienced difficulty. Distractibility and flight behavior increased sharply during the Postrotary Nystagmus subtest.

Clinical Observations

Vestibuloproprioceptive Functioning

On the Standing and Walking Balance subtest, which assesses central nervous system processing of muscle, joint, and gravity input, Gregory experienced great difficulty and frustration with tasks of sharpened (heel-toe) two-foot and one-foot balance and walking heel-to-toe and tasks requiring the eyes to be closed. On the Postrotary Nystagmus subtest, which measures central nervous system processing of vestibular (circular) input, the duration of rotationally elicited nystagmus was 5 sec after left rotation and 4 sec after right rotation. Although still in the dysfunctional range, these results indicate an improvement in vestibular processing since the start of therapy, at which time postrotatory nystagmus was barely discernible. This change should not be construed as simply a normal developmental occurrence, because even 1-year-olds typically show a postrotatory nystagmus of up to 10 sec or more. The frequency with which Gregory appears to crave rotational activities has decreased greatly, thus suggesting that his nervous system is now processing this vestibular input more normally.

Gregory continues to have some difficulties with lateral righting and equilibrium reactions. Protective extension was delayed at the start of therapy, but can now be activated in all directions. During the arm extension test, on passive head turning, Gregory shows poor dissociation of neck, trunk, and hips, with all tending to turn as a unit. Supine flexion is poor, but flexor postures in other positions elicited during therapy have improved in quality and duration. Although poor static prone extension against gravity is not expected to be of good quality in a 4-year-old, it can usually be elicited with accelerative linear movement stimuli. Stimulating extensor patterns (which are needed for cocontraction patterns and heavy-work activities) during treatment activities have been a chal-

Figure 1. Western Psychological Services ChromaGraph of Gregory's scores on the Sensory Integration and Praxis Tests (Ayres, 1989). Copyright ©1988 by Western Psychological Services. Reprinted for display purposes by permission of the publisher, Western Psychological Services, 12031 Wilshire Boulevard, Los Angeles, California 90025.
challenge for Gregory because of his low truncal tone. He becomes fatigued quickly and tends to avoid them.

Gregory's vestibular dysfunction results in more falls and injuries and in inefficient postural background movements, which further contribute to problems with coordination and motor planning. Lowered truncal tone, which can be caused by insufficient vestibular sensory support to the muscles, requires him to expend more energy to maintain an upright posture; this can also drain his attentional abilities.

**Somatosensory and Kinesthetic Processing**

Gregory's scores on the Graphesthesia and Localization of Tactile Stimuli subtests indicate that he continues to have difficulty with somatosensory perception, which research indicates is directly related to fine motor dexterity and praxis. His disorganized behavioral reaction during these tests (e.g., vigorous scratching, digging fingers into the skin, getting out of the chair and running around the room) also suggests a disorder in his neural thresholds for light tactile input, thereby causing these types of stimuli to be overregistered in the brain. Because light touch and pain stimuli travel the same pathways in the central nervous system, Ayres (1972) hypothesized that due to disordered processing, children like Gregory actually feel light touch as painful or noxious.

The short-term and long-term implications of the condition of tactile defensiveness in Gregory's case are distractibility, which hampers attention and information processing; oral hypersensitivity and rejection of many foods needed for good nutrition; and aggression toward other children in school who may inadvertently touch, brush, or bump up against the child. As Gregory moves into adolescence and adulthood, he may have problems achieving physical and emotional intimacy.

**Bilateral Integration**

Bilateral integration refers to the ability of the two hemispheres of the brain to communicate, share information, and develop their appropriate lateralized functions (e.g., spatial, perceptual, and holistic processing and left-body motor control in the right brain and sequential processing, language, and right-body motor control in the left brain). Gregory's dysfunction in bilateral integration is revealed in his low-normal score on Bilateral Motor Coordination; his avoidance of spontaneous crossing of the body midline (low Contralateral Hand Use score); his lack of established hand dominance; and his confusion on right-left directionality. This condition has often been associated with vestibular processing problems in factor analytic studies and is reported frequently by clinicians. The effects of inefficient bilateral integration can also be seen in Gregory's difficulty with both gross and fine motor activities that require the hands to work together, especially at midline. Poor unilateral fine motor performance is probably attributable to underdeveloped skill and dexterity in a strongly preferred hand.

**Praxis**

Gregory's test scores indicate that, compared with other children his age, his ability to imitate static postures, to sequence movements of the hands, and to construct a three-dimensional structure is within normal range. His Oral Praxis score, which measures the ability to imitate tongue, lip, and jaw movements, is in the low to low-normal range. His score on the Design Copying subtest, which requires planning of graphic reproduction, is also quite low. Gregory's initial difficulties with the planning aspect of gross motor performance have been resolved, although his coordination remains problematic.

**Visual Perception**

Gregory displays good abilities in motor-free visuospatial and figure-ground perception and with visuo-tactile cross-modal association, thus supporting the interpretation that his difficulties with the Design Copying subtest are due not to faulty perception of the stimulus designs, but rather, to the motor replication process.

**Discussion and Recommendations**

Gregory's performance on the SIPT and associated clinical observations indicate that although many of his dyspraxic symptoms, which originally hampered his ability to conceive and plan complex motor actions, have been resolved, he continues to experience difficulty in motor performance that requires efficient interhemispheral integration in the brain. Additionally, although functional improvements have been noted in many daily situations, Gregory continues to display significant problems in processing somatosensory input, especially light touch.

Occupational therapy based on a neurobiological model is designed to provide controlled sensory input, which demands increasingly complex levels of sensory processing and adaptive motor response from the child. For Gregory, occupational therapy with the use of sensory integrative procedures is recommended for a period of 1 year. Treatment sessions three times a week, 50 min per session, are recommended. The goals and objectives of such treatment are as follows:

1. Improvement in vestibuloproprioceptive processing
1. Able to balance on each foot alone for 10 sec
2. Able to shift weight and use other equilibrium strategies to maintain kneeling, half-kneeling, and squat positions during a play activity

2. Normalization of somatosensory processing of light tactile input
a. Achieves a higher score on the Localization of Tactile Stimuli subtest to within normal limits (i.e., above -0.9 SD)
b. Shows a 50% decrease in frequency of tactile defensive behaviors during the above testing procedures as well as during therapy activities and as reported at home
c. Shows a significant reduction in hyperaroused behavior related to reduction in tactile defensiveness

3. Significant improvement of bilateral integration processes
a. Demonstrates increased spontaneous midline crossing and use of each hand in contralateral body space upon administration of the Space Visualization subtest, such that the Contralateral Hand Use score is within normal limits (i.e., -0.9 SD or higher)
b. Selection of the left hand for unilateral skilled tasks increases from the current 55% selection to 80% selection
c. Shows increased accuracy of right versus left directionality identification from the current 60% accuracy to 100% accuracy

4. Significant improvement of fine motor skill in the preferred hand during functional tasks
a. Shows near-accurate to accurate replication of the simple geometric designs of a circle, a square, a triangle, a cross, and the letter x
b. Shows 80% independence in the use of clothing fasteners, such as zippers and large buttons, and the ability to tie the initial knot when tying his shoes

5. Completion of my 3-week tactile stimulation home program by Gregory and his family according to the procedures explained and outlined in the protocol

A reevaluation in 12 months has been planned. Monthly progress reports and a final discharge summary will be provided to Gregory's physician and the insurance company. ▲

References

Editor's Note. To continue the Case Report department, we need and welcome reports that document the practice of occupational therapy for specific clinical situations. Guidelines for writing case reports are available from the Editor.