**Sensory Processing Disorder:**

**De-mystified**

Research for the 21st Century

Fall 2011

**Professor Walls**

**INTRODUCTION**

What is Sensory Processing and Sensory Processing “Disorder”? Sensory Processing (formerly called "sensory integration") has to do with how people process all of the senses (sensations) that are experienced during life. This takes place in the nervous system and is a highly complex process. It involves the nervous system receiving messages from the senses (through the brain) and then turning those messages into appropriate responses. Almost any activity a person completes successfully, whether it is riding a bike, writing a name or finding someone in a crowd, requires the processing of senses (or sensory integration.) So the disorder associated with this process is known as Sensory Processing Disorder (SPD). When sensory signals get crossed or *don't* get organized correctly, a person might respond incorrectly. I have heard it being described numerous times as a neurological “traffic jam” and a person with SPD might be challenged to process and react successfully to information received through any, all, or a combination of the senses.

How does Sensory Processing impact a person’s life? It can create many problems in life, including clumsiness, behavioral problems, academic difficulties, problems with social skills and relationships, anxiety, and depression. While most people experience occasional problems processing sensory information, people who have been diagnosed with SPD have more intense and chronic difficulties that significantly impair everyday life. For example, when my son was younger, whenever he had to wait in line he would bump people. They would get irritated or angry and he wouldn’t understand why. Now, he overcompensates by standing back until everyone else is in line, and then he will carefully stand in the back, far away from people. This happens because his brain is giving him misinformation about where his body is in space, relative to other people and things.

What is the status of Sensory Processing Disorder (SPD) and can it be treated? One 2004 study shows at least 1 in 20 people (Ahn, et al. 290), and a more recent 2009 study shows 1 in 6 people (Ben-Sasson, et al. 706) experience diagnosable SPD symptoms. However, while schools, doctors, families and occupational therapists know of the realities of this disorder, and have each developed important understandings and therapies for people who struggle with SPD, the official recognition of it in the DSMR-IV has yet to be published. My goal in this research project is to understand SPD nuances so I can serve my son better, and, more affectively communicate SPD to the general public.

Sources:

Ahn, R. R., Miller, L. J., Milberger, S., & McIntosh, D. N. “Prevalence of Parents’

Perceptions of Sensory Processing Disorders Among Kindergarten Children.

*American Journal of Occupational Therapy* 58, (2004): 287–293. Web.

<http://www.sinetwork.org>.

Ben-Sasson, A., Briggs-Gowan, M. J., & Carter, “A. S. Sensory Over-Responsivity in

Elementary School: Prevalence and Social-Emotional Correlates.” *Abnormal Child*

*Psychology* 37 (2009): 705-716. Web. 21 Nov. 2011. <http://www.sinetwork.org>.

**TOPIC ANALYSIS**

**Academic Disciplines**

· Education (Special Education)

· Neurology

· Neuro-psychology

· Occupational Therapy

· Psychology

· Science (General)

**Library of Congress Subject Headings**

· Education:

· Internal Medicine:

· Psychology:

· Science:

**Key Words/Phrases**

· Learning disabilities

· Neurological Disorders

· Occupational Therapy

· Sensori-motor

· Sensory Processing

· Sensory Processing Disorder

**Databases & Periodical Indexes**

· Credo Reference

· ProQuest

· PubMed Central

**Description of experience**

I learned more than I anticipated during the process of using subject headings and keywords. Since my pathfinder changed two times, I had the opportunity to practice fairly consistently. I found that subject headings and keywords are really the foundation upon which all research material is produced. I thought it would be simple to use Sensory Integration Dysfunction as the subject heading, but what I didn’t know was that since my son has been diagnosed, the term has changed to Sensory Processing Disorder. Because of this, I did not receive a lot of current sources at the beginning of my research and that forced me to try other words and phrases. After learning about the Boolean words, that added to my efficiency. After trying sensory AND integration OR processing, I was finally flooded with sources, which led to more sources, including the subject of my research, Sensory Processing Disorder. I understand much better now, that it truly is a process, and not as simple as inputting the most obvious words and phrases.

**BEST REFERENCE SOURCES**

**Encyclopedias**

*“Sensory Integration Disfun*ction." Encyclopedia of Special Education: A

Reference for the Education of the Handicapped."Hoboken:

Wiley, 2006. *Credo Reference*. Web. 30 October 2011.

The Encyclopedia of Special Education gives a thorough definition of Sensory Integration Dysfunction (or SID), which is now referred to as Sensory Processing Disorder (or SPD), and its symptoms, as well as, treatments that are common to it. The theory of SID was developed by A. Jean Ayres, an occupational therapist with training in neuroscience and educational psychology. It is written for anyone in education, particularly Special Education, however, the language used is appropriate for anyone interested in the subject. The only bias is that some information might reflect the perspective of a person with the disability, for example, focusing on the social implications of having the disorder. This article will be very useful to my research topic because it provides an easily understood, thorough explanation of SID, a list of how it might express itself in someone who has SID, and typical therapies that are associated with it. Although it was published in 2006 and some information might not be current, overall, it serves its function as a solid background resource.

Turkington, Carol, and Anan, Ruth. *Encyclopedia Of Autism Spectrum Disorders*. Facts on File,

Inc., 2007. *eBook Collection (EBSCOhost)*. Web. 14 Nov. 2011.

Carol Turkington, is a medical writer and has published numerous books on autism, brain disorders, and other related on non-related topics. Ruth Anan Ph.D. is a clinical psychologist who focuses her efforts on the early interventions of autism spectrum disorder. This work is noted to be recommended for both healthcare professionals and lay readers. There is a complete section in this encyclopedia on sensory processing and sensitivities. Any bias reflected is shown from the angle of a person with the disorder, such as how it affects the person, those around him/her and difficulties that might arise in academic, social and professional situations. This book provides not only definitions, causes, symptoms and therapies, but also, early intervention therapies which is extremely important in cases of sensory processing disorder, and a great place to start when discussing any therapies. Also, the second half of the book is filled with related organizations, web sites, and resources by state. While the book was published in 2007, and doesn’t contain the most recent research in the area of SPD, much of it is still up to date, and I did not encounter anything that was no longer true. Finally, the latter portion which contains resources, is still very current, as many of the websites and organizations are interactive and are updated frequently.

**Relevant Organization**

Miller, Lucy. “About SPD.” *Sensory Processing Disorder Foundation.* SPD Foundation. n.d.

Web. 22 Nov. 2011. [<http://www.sinetwork.org/index.html>].

Sensory Processing Disorder (SPD) Foundation

5420 S. Quebec Street, Suite 135

Greenwood Village, CO 80111

(303) 794-1182

Sensory Processing Disorder (SPD) Foundation is a Denver based, national organization that focuses specifically on sensory processing disorders. The SPD Foundation’s goals include: research, education and advocacy; and, it works with the SPD Scientific Work Group, which is an international group of scientists with expertise in various aspects of SPD, as well as, the Sensory Integration Research Collaborative – a group of specialized occupational therapists. Dr. Miller also founded the STAR (Sensory Therapies and Research) Center which is also located in Denver. The SPD Foundation is expanding the number of expert clinicians by providing an [Intensive Mentorship Program](http://www.spdfoundation.net/mentorships.html) where upon completion an Advanced Mentorship Certification is given. This website is set up clearly, it is very easy to navigate, links are functional, relevant and current. It is specifically designed to provide everything that anyone might need or want to know about SPD including pages of references, sources, new research, a parent forum, a library, local groups, treatment, etc.. This site will not only benefit my research, but has the potential to enrich the lives of many people affected by SPD.

**Statistical Source**

U.S. Department of Education. National Center for Education Statistics. *Fast Facts.*

Institute of Education Sciences. 2011. *National Center for Education Statistics*.

Web. 22 Nov. 2011. <http://nces.ed.gov/fastfacts/display.asp?id=64>.

National Center for Education Statistics

U.S. Department of Education

PO Box 22207

Alexandria, VA 22304

Toll-free phone # 877-4-ED-Pubs (877-433-7827)

TTY/TDD toll-free number: 877-576-7734

FAX: 703-605-6794

e-mail: edpubs@inet.ed.gov

This is a government site that gives accurate and up to date information on learning disabilities in our public schools from 1976 – 2009. Its purpose is to collect, analyze and post data related to U.S. schools, and the statistics of disabilities is only one of those things. This site is helpful as it contains narrative and visual charts of various disabilities. This makes it easy to compare different issues and most interesting to me is the number of people and disabilities being reported throughout a specified number of years. Many disabilities have gone up dramatically in recent years. This site is geared for not only the public, but organizations get their official information from here; like: newspapers, businesses, educational agencies, state and federal agencies as well as congress. The only downside is that it takes a while for these statistics to be compiled and published, for example, what was recently published in 2011, was the results found in 2009.

**BEST BOOKS**

Tanguay, Pamela B. *Nonverbal Learning Disabilities at Home: A Parent’s Guide.*

London: Jessica Kingsley, 2001. Print.

Pamela Tanguay, a mother of a child with a nonverbal learning disorder, turned researcher and owner of *NLD on the Web, and a* founding board member of ASC-US Inc, (a national, non-profit advocacy group that supports those with neurologically-based communication disorders) has a lot to say in her book. Her purpose is to discuss problems related to NLD (like sensory integration) in everyday life, and then suggest strategies for helping to “cope and grow” (Tanguay, p12). Her bias comes from being a parent of an NLD child, so the article reflects that perspective. For this same reason, this book is perfect for family members dealing with NLD, or someone wanting to understand it from a personal perspective. For researching SPD only, this is an average source, due to its limited resources on SPD, and yet a good background source, since SPD and NLD frequently co-exist. While the contents might be missing newer research, the material that the book contains is accurate, although published in 2001.

I found this book during my library visit. I recognized the name of the author as being someone on the forefront of sensory processing related disorders. The combination of this well-known author, title (which has to do with “at home” issues) and table of contents that had a special section on SPD is what made me include this as a best book. This book will be valuable to my research specifically because it discusses causes, personal strengths and weaknesses, social implications, and building skills in the following areas: parent roles, self-help and fine motor skills, managing the environment, organization, thinking skills, and at the end, she provides pages of related internet resources and organizations that might be of help.

Martin, Marilyn. Helping Children with Nonverbal Learning Disabilities to Flourish: A

Guide For Parents and Professionals. London: Jessica Kingsley, 2007. Print.

Marilyn Martin is an educator, who returned to school for a master’s degree in order to try to make sense of what was going on with her daughter, who had been diagnosed with Nonverbal Learning Disability (NLD). This book is about NLD, which includes many of the same symptoms and treatment possibilities as sensory processing disorder (SPD). The bias is similar to what I have seen previously, in that it provides information from the perspective of a mother whose child is inflicted with this disorder. Everything in it, comes from an angle of “helping” children be more successful in the various aspects of life. This is the most current book that I found in the library regarding SPD. For researching SPD only, this is an average source, due to its limited resources on SPD and yet a good background source, since SPD and NLD frequently co-exist.

I found this book on Amazon, while searching for books on both NLD and SPD. I chose this as a best book because it provides a very well-rounded look at non-verbal learning disabilities (which my son also has) and a specific section dedicated to SPDs. This book makes an excellent contribution to my research in that my son also has NLD, so while I focus on SPD for this research, the material covered in this book will be completely applicable to our personal circumstances – it will provide a context to look at SPD. Ms. Martin has broken the contents into relevant chapters, beginning with the traditional definition, symptoms and diagnoses, etc., and then discusses the importance of accommodations and therapies – specifically the importance of the school environment and family’s role. Finally, a sampler of interventions is provided for various aspects of the disorder.

**PERIODICAL ARTICLES**

Cermak, S. A., Coleman, G., Bodison, S., & Lane, C. (2011). Verification and

clarification of patterns of sensory integrative dysfunction. *American Journal of*

*Occupational Therapy*  65.2 (2011): 143-151. ProQuest. Web. 14 Nov. 2011.

Browsing through ProQuest, I came across this study by Dr. Cermak. She holds Bachelor and Master level degrees in Occupational Therapy, and she received her doctoral degree in Special Education. One of her specialties is in the area of autism and sensory processing. This article discusses a specific research project, referred to as a “retrospective study” in which researchers look at patterns of sensory processing issues of children who have already been diagnosed. Dr. Cermak then compares her results with historical data and finds they are similar. It was a carefully conducted study, successfully showing something rather conservative, along with being found in an academic journal, there was no obvious bias. It literally clarifies and verifies that what has been shown in the past is consistent with what is shown now.

Next, the article looks at specific types of sensory processing problems that may affect “childhood occupation.” It is the aspect of childhood occupation that most interests me. This portion will be helpful in that it breaks down the occupations of children into manageable segments and focuses on how specific sensory processing will impact them, for example, personal space issues (of body awareness and knowing where the body is in respect to other things) could be troublesome socially. The specific information will assist in providing the research components of: the types of sensory processing, symptoms applied to life and thus, direct my research to appropriate therapies. The main limitation of this article is that it does not provide or contribute anything new or groundbreaking; its function is to simply re-confirm what the researchers thought they knew. Overall, given the credibility of the journal, the non-biasness of the study, its duplication of what has already been shown and its current publication of 2011, this is an excellent source.

Miller, Lucy J., et al. “Perspectives on Sensory Processing Disorder: A Call for

Translational Research.” *Frontiers in Integrative Neuroscience* 3.22 (2009): Library

Research, PubMed Central. Web. 8 Nov. 2011.

Many articles in the periodicals from PubMed Central are very complex and I did not always understand them. This particular one, however, I was able to follow and will be helpful to my research. The authors are all part of the Sensory Processing Disorder Foundation, in Greenwood Village, Colorado, and are associated with University of Colorado at Denver. This article, looks at two different fields and their approaches. The first is “sensory integration” in a clinical setting and the other, a “branch of neuroscience that conducts research in an area also called sensory integration (Miller, et al).” This article notes that the current term for the disorder is sensory processing disorder (SPD). While clinicians examine patterns of dysfunction, theory, assessment and treatments, neuroscientists see sensory integration as much more pointed - “ converging information in the brain from one or more sensory domains” (Miller, et al). It also includes a sub-group called multisensory integration (MSI) and refers to the brain process that occurs when “sensory input from two or more different sensory modalities converge” (Miller, et al). Miller discusses how it is critical to understand the specific meanings each provide. A refinement of these definitions will impact the conceptual model of sensory integration and even the treatment of it. The authors discuss what they call a “translational approach” and how to facilitate this between specialists in the two fields. Ultimately, they believe that “multidisciplinary, collaborative studies (Miller, et al), would make both fields much more knowledgeable of brain function, leading to significant treatments and therapies for people with sensory processing disorder. The authors seemingly wrote this article for people within the profession, out of a need to translate and share their research amongst one another for a more holistic understanding. This article describes and promotes how to facilitate this value amongst people from different fields, who are each examining elements of sensory processing disorder. The fact that this article was written by one of the top specialists in the field of SPD, presented in a well respected neuroscience journal, includes only relevant information to SPD and is fairly current (2009), shows that this resource is a strong one.

I look forward to delving more deeply into this article for my research , because it will provide two pieces of the sensory integration “puzzle” (clinical and neuroscience specific) and then inform me as to the implications of “translating” that research between the two fields. I am also hoping to understand more fully, how to conduct “translational research” myself, and thus, personally applying it to other fields which also study sensory integration. Regardless, if I only learn what is in this article and nothing more, I will have more complete research and my own knowledge and understanding of this disorder will have grown significantly – because of these qualities it is an excellent resource.

O'Hara, N., and G. Szakacs. "The Recovery of a Child With Autism Spectrum Disorder

Through Biomedical Interventions.” *Alternative Therapies in Health and Medicine*

14.6 (2008):

**INTERNET SOURCES**

*LDOnline*. WETA-TV (PBS), 2010. Web. 6 Oct. 2011. <http://www.ldonline.org>.

LD Online (Learning Disability Online) is a national learning service that advocates for those with learning disabilities. WETA – TV (Public Broadcasting Service) in Washington, D.C. has a [Learning Media](http://www.wetalearningmedia.org/)department which has created this website. It provides current, relevant, accurate information and resources for people with, and families and teachers of, learning disabilities. It targets parents and teachers of LD students, as well as, children and adults with learning disabilities. Email and hyperlinks are both viable and reliable. This site is extremely current and active. It provides a weekly e-mail and monthly e-newsletters updating subscribers to news headlines and learning materials. It also has forums for children, parents and educators to participate in discussion, as well as doctors who post regularly on the blog. This site will be very useful to me, as it will provide basic, background information on learning disabilities from sensory integration to visual motor perceptual details. Its primary limitation is the fact that this website tries to cover all learning disabilities, which can only be done at a more surface level than specialized sites. However, the resource list that it provides will link me to other information I might need for my project. The components, content and sources in LD Online are thorough, currently valid and easily accessible.

*Learning Disabilities Association of America*. LDA of America, 2005-2011.Web. 7

Oct. 2011. <[http://www.ldanatl.org>](http://www.ldanatl.org/).

Learning Disabilities Association of America is an all volunteer community and its goal is to create opportunities for individuals with learning disabilities (LDs) to be successful through services, staff, activities, professional advisory board (which is VERY impressive!), position papers, and a charity. Since evolving from its start in 1963, this group is now the Learning Disabilities Association of America (LDA). There is a scaffolding of volunteer positions, from business people, to educational specialists, therapists, two medical doctors, five Ed.Ds and five Phds.

There are active state chapters, annual conferences, a calendar of events, and constant legislative updates, as well as interactive opportunities for parents, teachers, professionals and adults. The site is divided into various sections which are being updated regularly. This website will extremely useful to my research. It is extremely large and broken down into very specific and deep ‘chunks’… from social, educational, psychological needs to family and careers. This site also lends itself to answering questions if something needed isn’t on the website. I feel comfortable, that anything I need for my research can either be found here or found through this most excellent site. As with my other website above, the components, content and sources of this website are thorough, currently valid and easily accessible

**NON-PRINT SOURCE**

“Preschool U: Sensory Processing Characteristics and Strategies.” Public Broadcasting

Service (PBS), 1995-2011. WBGU/eTech Ohio Collaborative Multimedia, Web. 12

Nov. 2011. <[http://www.wbgu.org/preschoolu/videos/psuvid4.html>](http://www.wbgu.org/preschoolu/videos/psuvid4.html).

This video is put out by the Public Broadcasting Service and narrated by Kim Christensen M.Ed. who is a faculty member in the School of Intervention Services at Bowling Green State University in Ohio. This video provides information that none of my other resources has in terms of therapy for sensory processing disorder. The information put forth is proactive and structured under the umbrella of “sensory diet”. It provides definitions of and supporting aids for each of the human senses: visual, auditory, gustatory, olfactory, proprioceptive and vestibular. So far, this resource is the only video I have included and the only one which has broken down sensory processing into the different senses and what consists of a healthy “diet’ of each. The visual quality itself is clear and the presentation is standard, consisting of a person standing in front of the camera talking. While it is not an exciting or high-end presentation, this video information will add depth to not only my definition, but symptoms and therapy sections as well. Its strength is also its weakness. Overall, the video not discuss all of the deeper issues and complexities of SPD, however, it is very clearly presented, easily accessible, and understandable list of effective therapies; and, that all it is meant to do.

**RESEARCH PROCESS**

My topic needed to be relevant to my son’s issues and my ability to research them. As a result, the title of my pathfinder has evolved from the interesting but overbroad “brain processing speed” and, the technical and too narrow topic of “sensory-motor integration,” to Sensory Processing Disorder (or SPD). I knew that much of the information needed would come from scholarly journals and professional periodicals because this field changes frequently as researchers learn more - for example, *Frontiers in Integrative Science* and *American Journal of Occupational Therapy*. So I delved directly into those professional periodicals. I was surprised and a bit disheartened, however, because I found that many articles and studies were much too technical for me to understand, and many of the reports very narrow in topic, so I wasn’t able to use all of them. Internet websites on the other hand, turned out to be one of my best resources because I found sites that exist specifically for people with SPD and their families, like SPD Foundation and NLD Online. These websites are easy to navigate, active and current, with highly qualified scientists and specialists contributing to them; and, the target audience is impacted families, so almost everything is easy to understand. This is very different that what I find in books and encyclopedias because they don’t evolve quickly and some information can be outdated very quickly. Still, books and encyclopedias served their purposes. Encyclopedias gave me basic definitions and symptoms, while books tended to focus on a particular aspect of SPD and provided narratives and context for all of the other information.

When I went to Whatcom Community College’s Library, on campus, I was comfortable because I could physically touch materials and there were people to answer my questions. However, once I understood how to correctly and efficiently navigate through the Internet information universes, it was less terrifying and more exciting. I am honestly looking forward to continuing my SPD research as well as trying out my skills on new topics.

The main challenge for me during this research process was my lack of knowingwhere to look for specific sources. Up until this class, I leaned heavily on specialists, the books to which they referred me, and Google. I felt lost when I began this course, the perfect illustration being when I was looking in ProQuest to find general and subject encyclopedia sources! Of course it is funny now, but I was very frustrated at the time. I had to come up with a strategy because I simply became overwhelmed and confused with names and places in the online library. As I completed different assignments, I organized myself by making a chart showing me where to look for the variety of sources I needed to find. This chart will be on my bulletin board long after this class is over… just in case I forget!