

Stories about fantastic, special children

Sensory Motor Skills: Functional Implications



Marga Grey

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by

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Red Flags to identify possible problems with Sensory Motor Skills ([link to website](#))

Introduction

Children - and adults - are hugely affected by poorly developed sensory-motor skills. In my work with children with learning issues, concentration problems, poor attention, clumsiness and atypical emotional reactions, I have come across so many with the underlying problems being issues with sensory-motor skills. I identify sensory-motor skills (during assessment and therapy) as being the underlying problem in almost 100% of children with attention, coordination and learning difficulties.

Sensory-motor skills are the basic foundation for learning. The activities and movement we do as infants, toddlers and children help to prepare our bodies and our brains to learn, to focus on a task, to follow instructions and for academic achievements/performance. The brain develops from the bottom up and from back to front, and this starts with movement and sensory exploration in the early years. Improving motor skills, sensory detection, and processing has to come before any other learning can take place, including behaviour, emotional control and academic learning.

Sensory and Motor Skills

Sensory skills are those such as vision, touch, smell, taste, hearing, vestibular (for balance movement and head positions) and proprioception (position and movement of the muscles and joints). Sensory skills are responsible for receiving information from the environment and from the body.

Motor skills are the responses our brain prepares once it has received information from our senses. After processing that information from our senses (ie relating it to previous experiences, analysing it, and understanding it), it prepares a response. The brain's responses to sensory information, are seen as reactions, body actions or motor skills. Motor skills include crawling, walking, running, ball skills, coordination, handwriting and speaking. Thus there are 3 parts used when sensory-motor skills develop or are in use:

1. The sensory organs which receive input from the body or from the environment
2. The nerves which carry messages or information to the brain where it is processed
3. The brain which determines the response and transmits the message or instructions to the appropriate group of muscles to carry out an (re)action.

The primary time for development of sensory-motor skills is from birth to approximately 7 years of age. During this time a child learns to move and learns through movement. This enables a child to learn about his own body and the environment.

Sensory Motor Skills comprise of:

- **Muscle tone, strength, coordination and balance** – the development of the vestibular system (inner ear) is the foundation of balance and postural control.
- **Body in space** – to know where the body is in space and in relation to other objects and people. This encourages the development of auditory and visual perception.
- **Rhythm and timing** are important for the development of sequencing, bilateral integration and bilateral coordination. You need this to do many different movements. For example, in swimming, you need good rhythm, timing of movements and coordination of bilateral movements (the two sides of the body).
- **Laterality** – the ability to identify left and right and to use one hand (and one side of the body) as the dominant side. It also includes going across the midline of the body.
- **Sequencing** is important for understanding 'order' (what comes first, second, etc) and is needed for academic learning, but also for rhythm/flow. It is the foundation for developing working memory.
- **Eye movements** are controlled by small muscles. To be able to follow a moving target such as a ball, you need accurate eye movements. You also need to control your eye movements when reading, if not, you will have difficulty following the line you are reading. Your eyes might also fatigue and you might avoid reading related tasks.
- **Praxis or planning** is essential for doing specific tasks - to know where to start and how to complete a specific task. This has an affect on the development of language and articulation in speech.

These skills and their development are critical to a child's learning. They enable a child to sit still for a period of time, to follow instructions in the classroom and at home and to complete tasks. Self-confidence comes with being in control of the body, and of reactions to changes in the environment. Also, it assists a child to complete tasks in a given time. The additional movement skills help the child to explore actively, to learn more with an open mind and enhances the child's personality. Sensory-motor skills help a child to reach his or her potential.

For most children, sensory-motor skills develop automatically while the child plays, runs, jumps, swings and is physically active. However, for some children this process takes longer, is not efficient, or doesn't develop fully because an underdeveloped nervous system causes inefficient processing of sensory information. The reasons why this happens are many and diverse and not included in the scope of this book.

I have used my experience of many years as a therapist, seeing children with a range of problems, to explain how sensory-motor skills affect children at different ages. These examples or stories are genuine case studies. However, pseudo names have been used. I have not included specific therapy strategies.

The aim of this book is to explain the effect that poorly developed sensory-motor skills have on children regarding their participation in age appropriate activities, their social skills, their self-esteem and their emotional development. The stories included in this book are about children whose main/underlying problem was sensory-motor. I have seen many other children with more complex needs, who needed extensive periods of therapy and interventions from multiple disciplines, including speech pathology, psychology, physiotherapy and medication.

I hope you enjoy reading these stories as much as I have enjoyed my work with these precious children and their families.

Chapter 1

INFANCY

A new born baby has been processing sensations long before birth. The sensory organs and nervous system start to develop during the first trimester of pregnancy. This means that the baby can perceive many things in the womb, e.g. hearing, feeling, tasting and, of course, as any pregnant mother would confirm, the baby can move in the womb and can exercise muscles.

The obvious senses are touch, taste, smell, hearing and vision. These senses provide information about the environment. The “hidden senses” are movement (vestibular) and the position of body parts (proprioception) and provide information about the body and the baby’s movement in space.

The senses develop and mature at different rates after birth. For example, vision cannot develop a great deal before birth but develops fast during the first 3 months of life. Interactions with the world, such as being moved, handled by others, swaddled, touching toys, hearing sounds, moving in and out of postures on the floor, tasting different flavours and looking at others, at objects and at their own body parts (eg hands, feet) aid in the development of the sensory systems. The brain detects and responds to this sensory information. This is called sensory processing. Sometimes something goes wrong when the brain processes the multi-sensory information from the environment and from the body. This is called sensory processing disorder or inadequate sensory integration.

Infant sensory-motor skills develop to enable the baby to move between different postures/positions. Initially a baby starts to gain some control over eye movements and the ability to hold the head upright, then to move the head. The ability to roll over onto the tummy and onto its back again is a major achievement for a baby – not only can the baby now move from one position to the other, but it can also perceive objects from different angles. This initiates the development of the visual system and visual perceptual skills.

Ken was brought by Mia, his single Mum, for advice at the age of 4 months. He was a healthy looking, chubby baby. However, on closer examination he was very quiet and didn’t look interested in his surroundings. He seemed apathetic. During tummy time he put his head on the floor and often cried in this position.

Mia was concerned about these observations she had made and so her doctor referred her to an occupational therapist.

The OT assessment indicated that Ken had low muscle tone and that his eye movements were not well developed. He actually had difficulty focusing his eyes on an object. He did not enjoy movement although he did not resist it either, e.g. when he was rocked or put on a swing, he didn’t show any specific emotional reaction –neither enjoyment or fear. His ability

to process touch was also poor as he didn't react to different textures on his skin; he almost looked as if he didn't feel or notice it.

We addressed the underlying issues with processing sensations of touch and movement first in therapy. Mia did activities with Ken at home that were advised in therapy. Ken became more "alive". He noticed objects, could focus on them for a longer period of time and actually played with some toys in his hands. Best of all, Ken became interested in movement and soon he was rolling over and enjoying tummy time.

His neck muscles strengthened and he held his head up for long periods of time. This encouraged muscle tone which improved postural control so that Ken could sit independently at 7 months of age! He now had his hands free to explore toys and objects; he could focus on them for increasing longer periods of time. He became a bubbly, noisy little boy, enjoying eye contact, movement and interaction. Now that the sensory-motor skills were developing, he wanted to use the new skills and became increasingly active, motivating himself into crawling at 12 months.

Improvement in the sensory-motor skills (touch and movement) helped this precious boy to develop, to learn and to thrive.

Chapter 2

TODDLER

During the first two years of a baby's life, sensory-motor skills develop rapidly. These skills encourage muscle tone, which assist the baby to maintain a good head position, to move the head and to maintain an upright posture when sitting. Balance is also developing. Muscle tone and balance depend on the vestibular and proprioceptive senses so that moving in and out of different body positions is possible. These postural movements encourage muscles to strengthen so that the baby/toddler can crawl, stand and walk. These are activities that we do every day without the need to think about them. However, they are complex movement activities which need practising to do at first.

Once postural control has been established, the two sides of the body need to work together to maintain balance, to use the limbs and to understand rhythm and sequencing. Crawling depends on the ability and skill to use both sides of the body (left and right) in a coordinated movement pattern.

Lucy was born at 30 weeks gestation – a beautiful, tiny premature baby. The nurses and doctors at the hospital were supportive and assisted Lucy's parents, Steve and Lina, with excellent advice. The importance of physically handling her, talking to her and spending time with her were emphasized.

Lucy developed well, picked up weight, was soon healthy and could be discharged. Her parents were thrilled to take her home. Very soon Lucy became restless with difficulty to self-settle. Her parents became exhausted as they had to rock her to sleep. She woke up often and couldn't settle again, she looked hungry but found it difficult to feed. She was put on supplementary formula but it didn't help to settle her. She was restless and her parents thought she was generally unhappy.

A medical check-up indicated that she was picking up weight and that she was normal and healthy in every aspect. Steve and Lucy were sent home with the feeling that they were doing something wrong because this healthy baby was not happy.

Lucy continued to thrive physically but often cried for long periods of time. Lina's back was aching most of the time because she had to rock and/or carry Lucy for many hours to keep her calm. At age 15 months Lucy was a healthy strong baby but she was not interested in crawling. She sat independently and played with toys for short periods of time but did not attempt to roll over or to crawl in any way. She was dependant on others to entertain her and to make her happy.

The occupational therapy assessment indicated that Lucy had problems with muscle tone, posture, balance and with bilateral movements. Bilateral movements are coordinated

movements of the two sides of the body, for example when you catch a ball with both hands and when you walk or run.

Underlying her bilateral integration issues was poor processing of movement sensations. Therapy consisted of many different activities that helped to process movement sensations. Initially Lucy was scared of moving in swings and hammocks but she soon learned to love the different movement sensations they gave her. These specific movements encouraged her sensory processing which in turn developed muscle tone, posture and balance.

At this stage Lucy enjoyed movement and when sitting on the floor, she was no longer afraid to move around. She had developed good posture to support movement – she was ready to roll, to rock and to begin moving from one area in a room to another. Very soon her stronger core muscles could support her body so that she could stay on all-fours! This was great to see as the next step was the crawling action.

Steve enjoyed the exercises that he had to do with Lucy to encourage leg and hip strength. Every day they could see how Lucy developed and thrived in all aspects. The frequent crying and clinging to Lina were replaced by a need to explore toys, rooms and by enjoying movement. Lucy used her newly developed skills and was crawling at 16 months and walked independently before the age of two!

These new skills not only gave her parents the peace of mind that their precious daughter is “normal” but it gave Lucy the opportunity to learn, to explore and to thrive. She now enjoyed playing with other children. She looked happy and had self-confidence to try unfamiliar/new activities, to interact with others and to reach her potential.

The underlying issue was mainly poor processing of movement sensations but Lucy only thrived once the sensory-motor skills (e.g. balance, muscle tone) developed to an age appropriate level. These skills helped her to play with peers, to develop self-confidence and to learn.

Chapter 3

The Pre-School Years

Sensory-motor skills develop mainly from birth to the age of 7. They continue to develop, mature and adapt throughout life. For example, when a child grows, the centre of gravity in the body changes and the vestibular system has to adapt to this to ensure effective balancing. The same thing happens in an adult when they pick up or lose considerable weight.

The best time to address the development of sensory-motor skills is during the pre-school years up to age 7. This is the time that a child is physically very active and are practicing newly developed skills. They typically run, jump, climb and move. They are so active! There is a legend that Roman soldiers were punished by forcing them to copy all the movements (and activities) of a 3 year old child for a number of days!

This is the time that the skills which developed during infancy and the toddler years are practiced and “fine tuned” to use in many different functional activities. For example, a 2 year old child can hold a pencil and can scribble but if you compare this to the mature pencil grip and hand writing of a typical 7 year old child, you can see the development that took place during the 5 years of practicing to refine (fine tune) those actions.

It is also interesting to note that while the child is active, running jumping and climbing, the fine motor skills needed for hand writing usually develop as well. As the child matures and grows, the need to move is reduced and at about the age of 5, you see the child more often drawing or “working” at a table. This indicates that the sensory motor skills are important building blocks for the development of other skills such as hand writing, reasoning, emotional maturity and academic learning.

Fortunately we now know that the brain can change and grow throughout life. Thus children who missed out on the effective development of the sensory motor skills can pick this up at a later stage through specific exercises and activities as you find in a program such as CoordiKids.

Precious Charlie. He was hiding behind his parents when I met them in the reception area. His big eyes were watching my every move. He followed his parents reluctantly to the therapy room and appeared overwhelmed in this room filled with suspended equipment such as swings and hammocks. Big balls stored high near the ceiling in one corner. Charlie clung to Rebecca who was patient to put him at ease. John told me about their concerns.

Charlie was behaving like a normal 4 year old when at home. However, as soon as they left home to unfamiliar places or even familiar places with strangers, he refused to leave his parents, to interact, or to play. He attended day care 3 times a week and never left the side of his favourite teacher. He would only participate in tasks with one on one support from

her. While the other children were running on the playground, swinging and chasing each other, he was quite happy to sit next to his teacher and watch the others.

Higher than normal anxiety levels were identified by Charlie's doctor and they were weighing the options to put him on medication. John and Rebecca were reluctant to do this and investigated all other options. They read about sensory processing and thought he ticked many boxes which indicated problems with this area of development.

As seen so many times, Charlie's parents were correct. Initially it was impossible to do an assessment and we started therapy with strategies to reduce Charlie's sensory issues and anxiety. He was sensitive to different touch experiences, to movement, to noise and to smells. We addressed these in individual therapy sessions, and at home with using a sensory diet.

Charlie made good progress and found it easier to settle into unfamiliar environments, to interact with others and to participate in many tasks. However, he continued to need one on one support for most activities and preferably demonstration and hand holding when attempting unfamiliar tasks.

An assessment was possible at this time as he was familiar with therapy and anxiety levels were lower. The assessment indicated problems with motor planning, also called praxis. This meant that Charlie knew what he wanted to do and knew what the outcome should be but had no idea of how to approach the task. For example, he knew that he wanted to use the slide and that he needs to sit at the top and slide down on his bottom. However, he had no idea how to plan this activity. He needed someone to hold his hand to help him plan – to make the first step, that is, to walk to the back of the slide and climb up the steps. This seems to be obvious. Not so for someone with dyspraxia or issues with planning.

As soon as Charlie learned from one-on-one sessions how to use the slide he could do it with ease. However, Rebecca reported on her disappointment when they visited an unfamiliar park over one week-end with friends. She was confident that Charlie would use all the playground equipment and especially the slide, which he enjoyed nowadays at day care. To her surprise, Charlie once again refused to use any equipment in the park and clung to her side.

This is what happens so often with children and adults with dyspraxia. They can use familiar equipment, follow familiar routines and participate in familiar activities but as soon as the activity, routine or equipment changes they have problems. This manifests in avoidance of the task, in meltdowns and/or in high levels of anxiety.

In Charlie's case he was young and we had time to address the different issues in therapy and with homework exercises. We focused on sensory-motor skills, including laterality, bilateral integration and sequencing, as well as planning.

After a few months John and Rebecca were thrilled when they saw the increase in Charlie's self-confidence. For the first time in his life, they had to look out for him when visiting parks and shopping centres. No longer did he cling to his parents but he explored and interacted within different environments. Soon after this they reported on how well he interacted with other children at day care. He greeted his teachers but was then off to explore and to interact with other children, not noticing when his favourite teacher was absent for a day.

Charlie could follow instructions and routines. His parents had become used to the fact that they could not change any routines and had accepted this. However, suddenly they noticed that he was coping well when they had to make changes because of family issues. For the first time in their life, his parents experienced how it feels to have a "normal" child who can cope with different situations, who can play and interact and who can adapt to changes.

This family is one that I'll remember forever. I never saw them again after Charlie turned five. At the time he was a self-confident little boy, on his way to school. He was coping well with all the different tasks at daycare which prepared him for formal schooling. re-assessment indicated average and above average sensory-motor skills, gross and fine motor coordination, well-developed visual perception and working memory. Charlie was ready to conquer the world! The very important foundation of sensory-motor skills enabled him to be the clever little boy who was previously locked behind anxiety caused by dyspraxia.

Chapter 4

Attending the BIG school

Exciting for some, scary for others; whichever way, when a child is about to attend the first days at formal school there are many different emotions in the child as well as the parents. Parents are concerned about their child's coping skills; if their child will meet the teacher's expectations; and if the child will compare positively with peers.

Our sensory-motor skills are the foundation for many other skills, including gross motor skills (needed to excel in sport), fine motor skills (needed to do arts and crafts, to draw, to write, to do buttons), following instructions, learning, and working memory. These skills develop the fastest between the second and seventh year of the child's life. During these years a child needs to move and to be active with the whole body to develop these skills.

Personally, I would prefer to have children in an environment where they can practise these whole body movements in many different activities to ensure a sound foundation. Some European countries use age 7 as the mandatory year to enter school. However, many other countries encourage children to go to 'preschool' (or kindergarden) and 'Prep' before the age of seven and sometimes as young as four years of age. These young children should have the opportunity to move and to be active for most of the day.

Many mathematical and perceptual concepts will be learned in an easy, natural way when using whole body movements and involvement in specific activities. This is the only way to ensure that the foundation of academic skills is well-developed. Programs that encourage the development of these skills should be followed by all children if not in the classroom, then at home or as part of extra classes.

Concepts of perception such as those which define 'position in space' (e.g. above, under, next to, behind, in front, left, right, up, down, inside, outside) help us understand our world and how we move within it. The best way for children to understand these concepts is to learn about them through play - with others and/or on playground equipment using whole body movements. Only then can they truly develop an understanding of those words on paper and have no confusion between the orientation of letters and numbers such as "d" and "b" or "f" and "t" or "13" and "31". Confusion with position in space causes many reading and spelling mistakes.

I can explain the other aspects of perception in the same way; however it is not within the scope of this book. That's another story – this one is about Jack.

Jack was a healthy, active five year old. He had attended Prep for the last 6 months. His teacher mentioned that she was concerned about his skills and did not feel he would be ready to proceed to Year 1 the following year (as per Queensland Australia requirements). Kathy, his mother, was devastated. She and his father, Dennis, perceived Jack as full of

energy but exceptionally intelligent with insight in many things. They could not believe that he had to repeat a year at this young age. The school recommended an occupational therapy assessment and a visit to a paediatrician and possibly a psychologist.

Dennis and Kathy told me more about Jack. He had always been very active but as he was the only child, his parents did not have siblings to compare him with and they felt that he was normal for his age. Jack preferred movement games and outside play. He avoided arts and crafts which Dennis thought is typical of a boy. Kathy had problems with mealtimes as Jack refused to sit at the table and the only way that she could get some food in him was to feed him in front of the TV. In general, Jack enjoyed playing outside, watching TV and moving around even inside the house. He was exhausted at the end of the day but reluctant to go to bed and took a long time before he eventually would fall asleep. Jack also avoided tasks like grooming and dressing. It often took excessive time for the family to be ready for outings. They were often running late because Jack was reluctant to cooperate.

Jack completed all tasks during the assessment but found it very difficult to sit at a table for longer than five minutes. He wiggled, fidgeted and asked numerous times if he can play on the swing. I had to give him opportunities to get off the chair, to jump on the trampoline and to swing for short periods of time – that's how he completed all tasks. The assessment results indicated problems with his sensory-motor skills, including balance, postural control, bilateral integration and sequencing.

As I explained the test results to Dennis and Kathy, it was as if a light went on for them – at last they understood why Jack had certain issues with mealtimes, grooming and why he avoided arts and crafts. Now that they understood his problem areas, they had new insight in the problems that Jack's teacher mentioned. For the first time, they actually believed that he might have issues in the classroom!

Jack had underlying problems with his ability to process touch, movement and oral sensations. These problems made it difficult for him to sit still, to maintain an upright posture (he always slouched or lied on the couch when watching TV), to maintain standing and sitting positions and remain focused with his attention on any task when he had to sit still. This explained why he avoided tasks at the table, including mealtimes and why he was falling behind in academic tasks – he literally did not sit still to practise any fine motor or writing related tasks.

In individual therapy sessions we initially addressed his modulation of sensations. Improvement in this area made it easier for him to focus. Then we focused on his sensory-motor skills to improve postural control, core muscle strength, and balance. He made significant gains with all of these over the next few months and started to sit at the table for longer periods of time. At last the family could enjoy meals at the table!

We then also addressed his bilateral integration and sequencing issues. Improvements in these areas made it easier for him to use both his hands in a coordinated way, so he could cut paper with scissors and use a knife and fork at mealtimes. He also understood sequences and could follow these to complete tasks such as grooming and getting dressed. Suddenly the family were on time for appointments. By then, his teacher reported that his counting and task completion are on par with his peers.

One day my usual question: "Jack, what would you like to do in therapy today?" was answered with: "Can we do a game at the table?" At last, he was able to sit still and to enjoying working at a table!

Jack was ready for Year 1 before the end of that year. His teacher was sure that he would excel. He enjoyed table work and writing related tasks but he was active on the playground and had exceptional ball skills.

I invited Dennis and Kathy to contact me immediately when any issues were observed or reported in Year 1. However, this has not been necessary. Jack had built a strong foundation through well-developed sensory-motor skills and could keep up with his peers and his academic work.

Chapter 5

School is easy – why do I struggle with spelling?

The ability to spell correctly is built on many other functions. Many underlying issues affect spelling, including:

- Visual perception (does the child perceive the visual image correctly? e.g. letters),
- Auditory perception (does the child hear the spoken sounds correctly? e.g. a word),
- Symbol recognition (does the child understand which sound is symbolized by which letter?),
- Sequencing (does the child remember the sequence of sounds and/or letters in a word?),
- Memory (can the child remember sight words, remember what has been seen or heard?).

As you have learnt in the introduction and previous chapters of this book, there are many underlying factors that can affect the issues mentioned above. We look at development in the same way as building a wall – with each layer of bricks built upon the previous layer and affecting the layer built on top. You can look back at the introduction to familiarize yourself again with the details of our sensory-motor skills.

Visual and auditory perception is built on the foundation of well-developed sensory-motor skills. A child needs to use whole body movements to develop these skills and to use them functionally to progress with academic learning in school.

Sequencing is developed when balance, rhythm, and bilateral coordination have developed. Sequencing is important for spelling and time tables but also for understanding time, for understanding the concept of before and after, and for remembering a sequence of events.

An example of a sequence of events is preparing for your day, such as getting ready for school. The child has to remember to dress, to groom, to eat, to prepare the school bag, to complete school work, to remember extra items such as sports clothes, library book etc. If a child needs constant reminders and prompting, he or she might have difficulty with sequencing, also called working memory.

This child might also find it difficult to start and to complete assignments or projects on time. These children may procrastinate as they do not know what the first step should be or the first task in the sequence of tasks that should be used to complete the project. They

tend to start at the last minute and do not organize the project effectively – creating a poor end-result after much frustration for the child and usually for the family.

Donna is the child of two professional people. She is highly intelligent with an excellent general knowledge. Donna has a good sense of humour and her communication skills enable her to participate in any adult conversation. Her teachers in Year 1 and Year 2 reported that she is one of the top students in her class.

Donna participated in dancing. She was well-coordinated and had good balance. Her dance teacher reported adequate skills although she seemed slower than her classmates to pick up new sequences in dance routines. This was put down to a lack of interest and a degree of distractibility during dancing lessons. Dancing was not seen as anything more than a hobby, thus her parents, Paul and Kelly, were not worried about her performance in dancing.

I met Donna when she was in Year 3. Her parents were surprised (and a bit annoyed) at her school teacher who mentioned that Donna had problems with spelling and that she was not performing according to her potential in the classroom. Paul could not understand how this teacher can observe problems when previous teachers reported above average skills.

Kelly gave me the referral from the teacher. Donna's teacher had observed that Donna did not often 'cross the midline' (ie reach across her body to the opposite side), and that she was slow with gross motor activities such as skipping and star jumps. She also mentioned that although Donna's spelling was above average, she often made mistakes by reversing letters, e.g. "d" with "b" and also with "au" and "ua". Donna was slow to complete some tasks which were thought to be a lack of interest.

I explained to Paul and Kelly that these observations were probably accurate as some children can keep up with the academic work by adapting and improvising. This works well in the younger years up to a point. In Year 3 the workload is larger and there is less time to complete tasks. This is usually the time when more subtle issues (that have gone unnoticed or were not a concern) suddenly become more obvious.

The assessment results indicated that Donna had problems with bilateral integration and sequencing which affects working memory. This explained her avoidance to cross the midline of her body, her difficulty with some gross motor coordination tasks and her difficulties with spelling. Her performance in dance class was probably due to difficulty with remembering longer sequences of movement.

Donna came in for individual therapy sessions. She was such a bright girl! She was motivated and understood the issues when they were explained to her. Donna wanted to overcome these problems and worked hard in therapy. The exercises that were given as homework were done religiously, 5 days per week, exactly in the way they were explained to Donna and her accompanying parent.

Therapy sessions and homework exercises involved activities and exercises to develop Donna's sensory-motor skills. Within a few months she was at the top of her dancing class. She learnt new dances with ease, her rhythm and timing improved and she could focus on the finer aspects of her dancing technique.

In the classroom Donna excelled. She enjoyed school and was actively busy with extra work, assignments and projects. She could fit these in her schedule as she completed her work in time, found it easy to plan projects and assignments and did not have to waste time on working out the correct spelling. Her handwriting had always been satisfactorily but it improved and she could write essays with ease. Her strong communication skills and her writing skills were now on par.

Donna was a very special and interesting child to work with. She challenged every task, asked questions about the activity but also about her improvement and skills at the time. The outcome was of course worth every challenge. My opinion is that therapy could have been avoided if she had developed her sensory-motor skills optimally at a younger age.

Chapter 6

All my friends have bikes ...

Bikes and cycling have become synonymous with childhood. Most adults can recall the times that they were racing on bikes with their friends. Despite falls and minor injuries, most adults think about these times as some of the best times that they have spent with friends. To feel the wind in your face as you speed off to keep up with your friends can be an exhilarating experience. To be challenged by steep, narrow, uneven or winding roads adds to this experience. Riding a bike can leave children out of breath but with big smiles on their faces.

For some children however, this can be a scary and most unpleasant experience. They might watch friends racing on bikes, balancing on skate boards or riding on roller blades with no other emotion in them than fear. An adult, who felt like this as a child, explained to me that he couldn't understand why other children looked as if they enjoyed these experiences. As a child his greatest fear was that he would fall. Usually this fear has its origin from an experience which ended in a fall.

To fall is humiliating to a child. It also registered as negative feedback in the child about the experience (emotional and physical). It is often accompanied by some form of disappointment in the supporting adult – as interpreted by the child. This adds to the negative feedback. Negative feedback makes it harder to try again.

Some children are scared even before they have their first attempt. They fear any movement when they are not in total control e.g. when walking on an uneven surface. These children might become anxious when climbing stairs, when jumping on a trampoline, when swinging on unfamiliar swings. In my experience they often avoid playing with peers in physical activity as the unpredictable movements of others and the accidental bumping into them make them anxious. The underlying issue would be poor processing of movement sensations and/or gravitational insecurity. The latter means that the person becomes anxious when the feet do not have contact with a stable surface such as a floor.

Difficulties with processing movement sensations creates problems with sensory-motor skills such as balance, muscle tone, posture and gross motor coordination. Rhythm and sequential movements are also affected. All of these skills are needed to ride a bike. You need to balance, to have adequate muscle tone and muscle strength to pedal; you need to maintain a stable posture and you need coordinated movements. When pedalling you use rhythm and sequenced movements. The two sides of the body also have to work together in a coordinated way to ensure smooth pedalling. If a child has problems with one or more of these areas he or she will either look awkward or it will be impossible for the child to ride a bike.

Let me introduce you to Johnny. I met Johnny when he was 8 years old. Johnny had many issues with handwriting and spelling in school. His teacher recommended an occupational therapy assessment and a test to identify possible dyslexia.

Belinda, a single mum, was concerned about her son's progress in school, and also about the cost of therapy. Johnny had been a happy baby with good sleeping habits and no feeding problems. During his pre-school years he seemed a bit clumsy- falling over his own feet- but he did well in the classroom and Belinda accepted that he might never be a good sportsman. Johnny often wrote his name in reverse (ie mirror image) and found it difficult to memorize words. In Year 1 he kept up with school work although spelling was a problem.

Johnny was slow to learn to skip and to do star jumps. Ball skills were low average and he avoided all sport at home and at school. Physically he looked slightly overweight, walked at a slow pace and came across as inactive. He liked being on the swings at the park but he was dependent on Belinda to swing him – he could not do this by himself. He claimed that he didn't want a bike yet Belinda confirmed that he had a bike but found it difficult learning to ride it. He gave up trying to ride and did not seem to have the will power to practise. This concerned Belinda.

The assessment results indicated that Johnny had problems with balance, bilateral integration and sequencing. His scores for these sub-tests were significantly lower than the average expected for his age group. The rest of the assessment scored above average for his age. Thus there was a huge difference between these skills and his other abilities.

Differences in skills and/or performance usually create some form of anxiety in the child and of course avoidance of the tasks that the child finds challenging. Therapy focused on bilateral integration and sequencing with activities called "brain bridging". Johnny was reluctant to participate in some exercises that included ball games. We then started with exercises that he found very easy and gradually increased the complexity of these exercises to make him feel more in control of his body and to ensure positive feedback from such experiences.

Within a number of weeks Johnny's abilities improved to such an extent that he was eager to try unfamiliar games. Belinda reported one day that she didn't recognise him when he came running towards her amongst a group of children at school pick up time! Never before had she realized that she identified him by his clumsy running style. Now that he was running with coordinated movements he didn't stand out in the group anymore.

Around this phase of intervention, we started to include activities that involve movement equipment and challenge the balance mechanism in our body. This was to make him aware of his improved skills and also to give him the self-confidence to attempt riding his bike once again.

Two weeks later he came in with good news – they went to a park over the week-end, took the bike along and he rode off! Belinda reported that it was one of the most amazing experiences to see this boy riding. He returned to her with shiny eyes, big smiles and pure enjoyment on his face.

In therapy the focus shifted to two dimensional tasks such as writing and spelling. The recognition of left and right on his body was well established but he had to understand this concept on paper to minimize reversals of letters and numbers. For the first time in his life, Johnny was able to recite and write the alphabet without hesitation and without support such as a song – sequencing was certainly well-developed on all levels.

During the school holidays Johnny attended his last few therapy sessions. He introduced me to one of his friends who came along. They were excited as they planned a bike ride with another group in the park after therapy. Johnny was also ready to participate in martial arts with his friends.

I saw Belinda in a shop a few months later. She told me how active Johnny was, that he lost weight and that he excelled in martial arts. In school he was coping well with tutoring to ensure that the foundation of reading, spelling and mathematics was firmly established.

Inadequate sensory-motor skills and specifically bilateral integration and sequencing, made it difficult for Johnny to cope in most aspects of his life. Once these foundational skills were developed as expected for his age, he could participate successfully in all the games that his friends enjoyed. And he could use his bike with ease and enjoyment.

Chapter 7

Sleep-overs

Most parents growing up in the 80's and 90's have fond memories of sleep-overs and sleep-over parties. My own children enjoyed these opportunities - to have extra time with friends AND their toys! However, not all children and their parents enjoy such experiences. It all depends on the family, the child's readiness to separate from his/her parents overnight and how well the families know each other. There is no right or wrong in these situations, but it can be daunting to leave your child in the care of someone whom you don't know well.

Some children are not emotionally ready for the overnight separation. There is no ideal age for sleepovers. The decision should be made in the best interest for the child. Parents usually have an excellent sense of their child's emotional development and might have the correct "feeling" about this.

However, some parents let go too soon, thinking they should push their child to be more independent. Pushing the child like this can have the opposite effect on the child, and can make the child even more dependent on the parents. Other parents are too scared to let go and want their children to be dependent on them for a longer period of time. Others just don't want to put the responsibility of their child's care onto somebody else. There is no right or wrong. Parents need to weigh up all options before making a decision.

If you think that your child is ready for a sleep-over or if you are forced to organize a sleep-over because of family circumstances, you should consider the following:

- There is no right age, thus don't tell your child that peers are enjoying sleep-overs and that your child should do the same.
- Talk it through with your child a few days before the event.
- Ask as many questions as possible about the routine and planned events at the host's house so that you can prepare your child for this, e.g. "Mrs White said that there will be three friends and all of you will sleep in Anna's room. You'll play board games before brushing your teeth and going to bed."
- Inform the host of your child's specific needs – it will only make it easier for all, e.g. possible bed wetting, possible night mares, the need to be covered and to cuddle a favourite toy before sleeping.
- Make sure that your child understands that you are only a phone call away and that you can be contacted.
- Do not be surprised to receive a call in the middle of the night that you should talk to your child or fetch your child – this happens to most children on the first sleep-over and is nothing to worry about.
- And last but certainly not least: make sure that the hosts are friendly, patient and supportive and empathetic towards your child and any possible issues that your child might have. If this is not the case, do not leave your child in their care.

An anxious child might need a trial before a full sleep-over. A trial means that you might leave your child at the friend's house until after the evening meal, after all evening activities and after the evening routine has been completed eg brushing teeth, wearing pj's. Then pick up your child to sleep in your own home. This will leave you with the opportunity to observe how your child will cope with such a trial experience. You might find that your child wants to stay longer when the opportunity arises again.

The child with poor sensory-motor skills and sleep-overs

The child with poor sensory-motor skills might need more guidance and preparation to enjoy sleep-overs. This child will have problems with most of the following:

- Planning the event
- Following a routine for getting ready to leave the house, to go to bed, to get dressed, to groom the next morning
- Difficulty with the concept of time - how long will this event take and when will the child be able to return to the familiarity of his/her home
- Finding belongings such as clothes
- Finding the way through an unfamiliar house
- Understanding how far it is to travel from the friend's house to home
- Adjusting the familiar bedtime routine of home to the routine at the friend's house
- Some of the games or activities might be difficult for the child to cope with. This will leave the child to miss home and to long for a familiar environment where games can be played on the child's terms and/or with the support of the parents.

It is obvious that if a child reacts emotionally to any of the above points, it will be perceived as emotional immaturity. The worst thing that you can do is to force your child to stay and to cope as you want him or her to "grow up" and "mature".

Read through these points again and imagine how difficult it would be for your child to put words to explain the problems that he or she is having. Your child may not realise that other children know exactly what is going to happen and in which sequence. A child with problems thinks that all people perceive as he or she does and then feels like a failure because everyone else seems to know what is happening and knows what to expect – they are more in control. Uncertainty usually makes the child with problems anxious, creates emotional reactions and makes the child feel incapable of coping with "simple" situations.

Hannah was a pale nine year old girl. She was diagnosed with anxiety. Her parents, Joel and Patricia, came for an occupational therapy assessment as they wanted to investigate all options to help Hannah before they tried medication. Hannah was a high achiever in school, the pride and joy of her parents.

Joel and Patricia indicated that Hannah's birth was complicated and that she has always been "sensitive". Hannah worked hard to meet her own high expectations in school and at home. She coped with most situations in class, enjoyed singing in the school choir and played the piano. Hannah was not very social and did not enjoy gatherings such as sporting events and busy shopping malls. She preferred to spend time alone or with adults. She often had small "accidents" of bed wetting and wetting her pants which left her shy and her parents confused.

The assessment indicated that Hannah had problems with processing touch sensations. Her body awareness was not fully developed as seen in her drawings and in her performance with certain movement activities. Core muscle strength and balance were not developed as expected for her age.

Therapy involved improving her processing of diverse touch sensations. Activities were done on a regular basis at home as well. Specific exercises to improve core strength and balance

were performed five days a week. In therapy sessions it was noted that Hannah could not always follow verbal directions and that instructions had to be repeated regularly.

Very soon, within a few weeks, Hannah's facial expression was more relaxed and she looked less anxious. Patricia reported that Hannah was quick to prepare for school and relaxed at the time of school drop off. Joel reported that she looked happy when he picked her up from school. The need to put extra panties in her school bag disappeared.

One day Joel arrived late at school to pick Hannah up. He expected Hannah to be at the gate in tears. However, he found her on the playground with a group of friends!

After about 8 months of regular exercises at home and in therapy, Hannah announced that she enjoyed a game of netball at school and that she wants to participate in this sport regularly. She was also keen to practise her piano lessons and made excellent progress with playing this instrument. When asked, Patricia could not remember the last time when Hannah had a bed-wetting "accident".

All of us were thrilled when Hannah announced that she was invited to her new friend's birthday and that she actually wanted to attend the event AND the sleep-over!

The problems that Hannah experienced with processing of touch sensations are often observed in children who have undergone some form of birth trauma. Improvement in the ability to process touch sensations improves body awareness also. This has a direct effect on awareness of a full bladder and thus on toileting and bed-wetting.

Balance and core muscle strength are influenced by our ability to process sensory-motor information to perform tasks with ease and successfully. Improving such skills made it easier for Hannah to sit for longer periods of time, e.g. when playing the piano. It also gave her the self-confidence and skills to participate in sporting activities.

These changes in Hannah reduced anxiety levels and made it easier for her to cope in busy environments. She now felt in control of her body, her environment and was ready to reach out to friends and to build relationships.

Chapter 8

Speech and communication

Sensory-motor skills are traditionally addressed by occupational therapists and physiotherapists. At first it doesn't seem to have anything to do with speech and language

issues or skills. However, there is a good reason why so many children attending occupational therapy are also attending speech pathology.

Processing sensory information in an effective way is important for the development of sensory-motor skills. This includes processing sensory information coming from the mouth. Issues with processing sensations at the mouth make it difficult for the child to cope with different textures, tastes and smells of food. The child can be a picky eater and limit food intake to a few textures, colours or smells.

Issues with sensory-motor skills impact on eating, speech and language in different ways:

1. Eating

The child might find it difficult to move food in the mouth, to coordinate the tongue and jaw movements and to initiate and complete the swallowing action. These children often prefer mashed food and/or soft food (like ice cream) and avoid chewy food (such as raw vegetables, fruit and meat). Meat has to be minced or mixed with other food if they eat it at all. Unfortunately sweets are easy to eat and give them a burst of energy too. Thus they might prefer unhealthy food and snacks to avoid the complex process of moving food around in the mouth - from the tongue to the molars, back to the tongue and then prepare to swallow.

A child with dyspraxia finds it difficult to coordinate all the different movements of the mouth and tongue and “gives up” on eating. To make things worse, the same child also finds it tricky to use a knife and fork to get the food to the mouth. Mealtimes might be messy with tension between family members.

It might also be difficult for the child to seal his/her lips when sucking with a straw, to close his/her lips when chewing and/or to copy some facial expressions.

When sensory-motor skills develop typically in a child, it allows for a wonderful experience over mealtimes and the ability to enjoy eating – and for the whole family to enjoy on a daily basis.

2. Speech

We practice making sounds in early infancy. We learn to use a multitude of muscles and mouth movements, involving our tongue, lips, cheeks and throat to produce the different sounds needed for speech. To say even one word, these movements should be produced with coordination and in the correct sequence. If this is not possible, the child will have poor articulation and incorrect pronunciations.

The child with dyspraxia and poor bilateral integration and sequencing will have problems with articulation to some extent. Speech problems could vary in severity. They could be severe (thus making it difficult to understand and follow a child's

conversation) or mild (particular sounds missing in a word or noticing small imperfections in a child's speech)

3. Language

Language is one of the most complex skills that a human has to learn. To create a sentence or story involves many aspects of planning and sequencing. The foundation of these is found in the solid development of sensory-motor skills.

Dyspraxia and poorly developed bilateral integration skills and sequencing skills can lead to problems with language. Understanding of positional words/concepts could be a problem. As mentioned earlier, articulation is likely to be a problem too. The ability to recall and reproduce events in writing or speak a sentence or relay a story, relies on the ability to place all words, sentences, ideas in the correct sequential order. To link multiple sentences to create an essay relies on sequencing and planning skills with language.

Language skills usually improve as sensory-motor skills improve and develop.

Chapter 9

Autism

Autism covers a wide spectrum of problems. However, for the purpose of this book I am discussing these from a sensory-motor perspective. Well developed sensory-motor skills will not prevent or cure Autism, but it can certainly help to minimize functional problems.

Autism comprises of a wide range of issues that can be easy or more difficult to identify. Sensory processing problems are an issue in most individuals with autism. Sensory processing problems seem to have two branches; one being modulation and the other being discrimination with motor planning problems. Poor modulation creates many emotional reactions and poor self-regulation. Poor discrimination and motor planning are part of poorly developed sensory-motor skills and create avoidance of activities, poor planning and dependency on routines.

Once a therapist has addressed modulation issue - where, the child is able to have more typical emotional reactions and be better at self-regulating - only then do the obvious problems with praxis (discrimination and motor planning) become noticeable. These do not only create problems with physical tasks, daily activities, classroom activities and routines but also with language and speech.

Five year old Andrew came into the therapy room and looked at the fan in the corner of the ceiling. While Melissa, his mum, tried to communicate his main problems and tell me about his history, Andrew asked repetitive questions about the fan:

“How fast can the fan go?”

“Where do you put it on?”

“Can I put it off?”

“Why does it make a noise?”

“Where did you get the fan?”

Andrew was obsessed with anything rotating. He used a limited range of words and sentences were short and repetitive. He did not seem interested in the answers nor did he seem to understand the answers to his questions.

According to Melissa he had difficulty coping in new or different situations and used repetitive questioning or repetitive movements such as hand flapping when he was overwhelmed. This could easily escalate into a “meltdown” (that is, falling apart emotionally).

Andrew was not ready for a formal assessment. We used a sensory diet strategies at home, intensive sensory integrative therapy and a strict daily routine for him to follow. When Andrew showed improved attention and self-regulation, we did an extensive assessment on sensory processing and praxis. The assessment results indicated that he had mild sensory processing problems and very low scores for praxis. Andrew could not plan simple activities

and was at a loss when familiar routines were changed – he could not cope with changes as he could not make “new” plans or plan new routines. These difficulties alone were frustrating for him and made it difficult for him and his family to cope in many circumstances.

Many of his sensory-motor skills developed according to expectations for his age - these included balance, postural control, eye movements, muscle tone. However he had significant difficulties with two-dimensional and three-dimensional construction, copying of body positions, sequencing of movements, and following verbal directions. This meant that he had difficulty with almost all tasks in the classroom. I can only imagine how this would have increased his anxiety and frustration!

Andrew and Melissa did an intensive course of exercises at home as well as intensive individual therapy. The exercises were focused on his sensory-motor skills, including sequencing of movements and planning.

Slowly but surely Andrew gained control over his daily activities. He could adjust to small changes in routines, listening to and following verbal directions became easier and he could cope throughout the day in the classroom. His teachers understood his problem areas and made adjustments in the classroom to make it easier for him. He found physical activities easier and was seen to play with peers in the playground and got involved in ball games with adult guidance.

Academic work was on par with his peers, spelling and reading improved and he could construct sentences as expected for his age. Fine motor tasks and hand writing received extra attention at the time.

Andrew moved to another therapist because of logistical problems. They continued with therapy and focused on sensory-motor skills, planning and some minor visual perceptual skills. He was also involved in speech and language programs to improve listening skills.

Melissa contacted me when Andrew was 9 years old. Her big news was that Andrew’s diagnosis of Autism was removed. He was now attending school without any “labels”, without extra support and full of self-confidence!

Chapter 10

Attention issues

Attention and concentration issues are probably the single most often used reason for referral to paediatric occupational therapy. If it is not the main concern of parents and teachers, it has certainly become one of my concerns. I have paid many school visits and observed many children in the classroom setting. During these times I could usually identify at least 10% of children in that classroom with some form of attention problems.

How do sensory-motor skills fit into these issues? At first glance it doesn't make sense that restlessness or the inability to sit still can have anything to do with paying attention and staying focused on a task. Yet it does!

During the the pre-school years, when the optimal development of sensory-motor skills occur in the child, the ability to concentrate for longer periods of time on one task also develops. This comprises of, the ability to sit still, the ability to maintain a specific posture and the ability to follow the sequence of steps in the task to name a few. All of these are directly linked to sensory-motor abilities. It also involves the ability to follow directions

(verbal or otherwise), the ability to plan a task, to know when and where to start with a given task and to complete a given task in the expected timeframe. Being able to plan for and complete a set task relies on bilateral integration and sequencing (aspects of sensory-motor skills).

There are certainly other reasons for poor attention as noted in conditions such as ADD and ADHD. Nutrition and allergic reactions are linked to poor concentration. Physical illness, genetic syndromes, poor sleeping habits and intellectual and/or physical disability affect the ability to focus for periods of time. Also, the child's interest in a task, the child's ability to understand the task and the child's ability to complete that task might make it easier or more difficult to pay attention. Emotional aspects such as tension in the family, concerns about friends, poor social skills and poor self-regulation can have major effects on concentration too.

Sensory-motor skills are important for attention. Without the development of these skills, optimal attention would be almost impossible. This means that even if the child has one or more of the issues mentioned above and the child has some issues with sensory-motor skills, concentration will improve when sensory-motor skills are developed.

Charlotte was only 3 years old when I first saw her and her anxious mum, Susan. She was very small for her age. She was wearing glasses and walked with an unstable gait. As we moved from the reception area to the therapy room she was distracted by people and objects along the way, by every small detail in the passageway. Charlotte was diagnosed with the genetic disorder known as Prader-Willi Syndrome.

(The Better Health Channel provides the following summary: Prader-Willi syndrome is a rare genetic disorder that affects development and growth. These children present with a short stature, eye problems, possible skeletal abnormalities, possible intellectual disability and excessive eating, which often leads to obesity. Although there is no cure, treatments can improve the child's quality of life.)

After an informal assessment, I identified many sensory processing issues in Charlotte. We decided to focus on these in therapy and in a home program. Functional issues would be addressed through a sensory diet done at home.

Charlotte enjoyed therapy sessions but it was quite challenging for her to focus on any task for longer than a minute or two. This meant that she jumped off any equipment without warning nor with any regard for safety. Her body awareness skills were poor which left her with little understanding of directions such as: "turn around"; "stand with your feet together"; "put your hands on your head". This made it difficult to engage her in activities involving physical movement. Fine movements of the fingers and hands were clumsy and we wondered if she had difficulty seeing lines on paper, or beads or other small objects while doing fine motor activities. Poor oral-motor skills caused poor articulation, difficulty with

eating and swallowing and the presence of excess saliva outside her mouth. She found it impossible to blow into whistles.

At first, Charlotte would talk throughout her therapy sessions as a way to control the flow of activities. Her articulation was poor, but talking seemed to help her focus on a task for longer periods.. It meant that she did not get as distracted by having to listen, understand and follow directions.

Through many therapy sessions which focused on the integration and processing of sensations, Charlotte became aware of her body and of what she can do with her body. She used movements in a more functional way. Saliva control became easier. Slowly therapy sessions could focus more on the sensory-motor skills to improve her walking, balance, bilateral integration and sequencing. Articulation also improved. Major improvements were seen in her ability to sit still for longer periods of time, in her muscle tone and muscle strength. This also made it easier for her to listen more and to talk less. At this stage of therapy she was able to listen and to understand a longer sequence of instructions.

Charlotte is now attending formal school in a mainstream classroom. She copes with the work level of Year 1, with some extra support. She has the skills to progress into Year 2.

Charlotte tires during the day and the opportunity to rest or sleep for short periods throughout her school day are provided for. Susan is limiting extra activities to ensure that she can cope with all the important things that she has to do in her day. This involves full days at school, therapy sessions, homework, swimming and dancing classes.

Charlotte will always have Prader-Willi Syndrome: she'll be shorter than her friends, she'll always be on a strictly controlled diet, she might always fatigue sooner than others. However with improved sensory-motor skills she can cope with so much more during the day. She can enjoy a life much closer to the one typical of her peers.

It is such a joy to see Charlotte in therapy sessions. She is proud of her work and interested to try her best with all tasks. She looks happy and conversations with her are typical for her age. I cannot help but wonder how she would have coped if she and her parents didn't work so hard on strengthening her skills and improving her ability to be focused and attentive, thus enabling her to continue learning and growing.