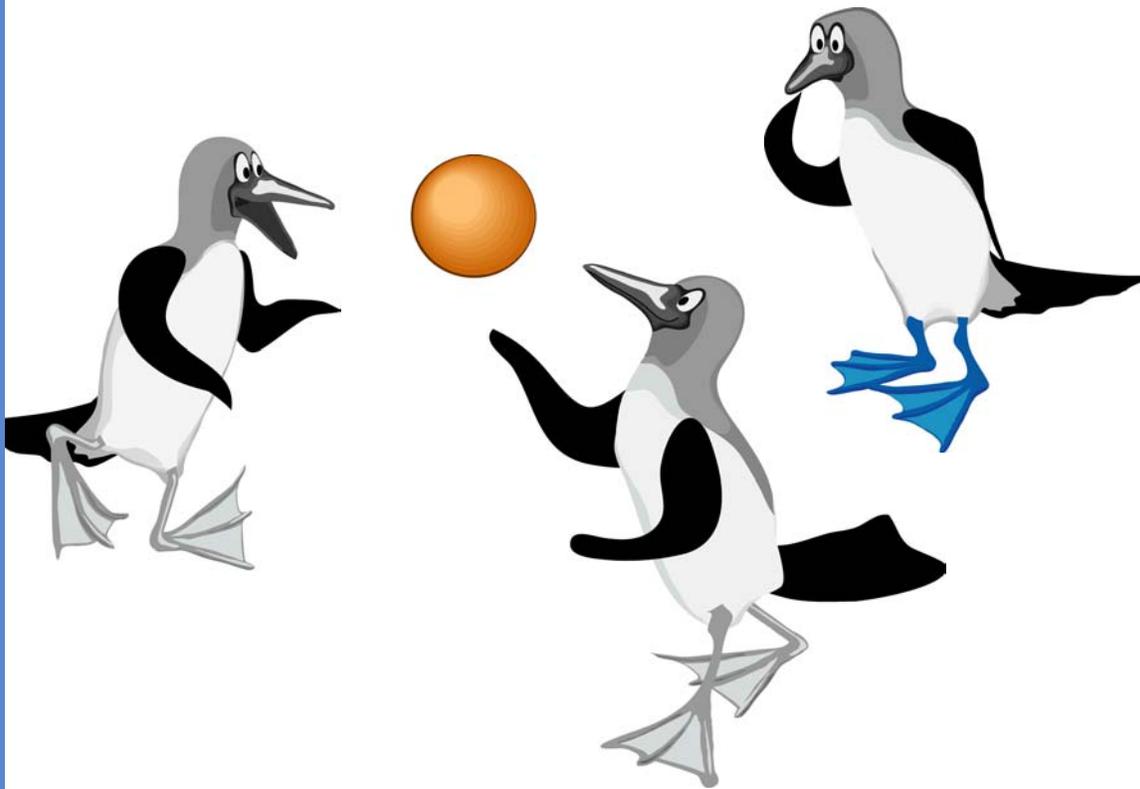


# Children with Developmental Coordination Disorder: At Home and in the Classroom



**Cheryl Missiuna, Ph.D., O.T.Reg.(Ont)**



McMaster University  
School of Rehabilitation Science  
1400 Main Street West, IAHS 408  
Hamilton, Ontario, Canada L8S 1C7  
Tel: (905) 525-9140 x27850  
[www.fhs.mcmaster.ca/canchild](http://www.fhs.mcmaster.ca/canchild)

## Introduction

This booklet is designed to help parents and teachers identify and manage schoolaged children who are demonstrating a cluster of movement problems typical of children with Developmental Coordination Disorder (DCD). Its purpose is to describe common characteristics of children with motor coordination difficulties, to provide guidance for seeking a referral to a physician, to describe the role of occupational therapists and other service providers who may work with these children, and to suggest modifications which may improve the ability of children to function at home and in the classroom.

Some children only experience coordination difficulties while others have associated learning, speech/language and attentional problems. Management of children with DCD varies greatly due to these differences. As a result, particular techniques and strategies may be more appropriate for one child than another. This booklet describes some of the more common techniques and practical suggestions that may be used. An occupational therapist may wish to highlight or add specific techniques in order to personalize it for a particular child/student.

*The author gratefully acknowledges the many parents, children, teachers, occupational therapy students, and service providers who have taken time to contribute their knowledge and expertise. Development of this booklet was supported, in part, by the Canadian Occupational Therapy Foundation and the support provided to the author by the Canadian Institutes of Health Research in order to facilitate early identification of children with DCD.*

## What is Developmental Coordination Disorder?

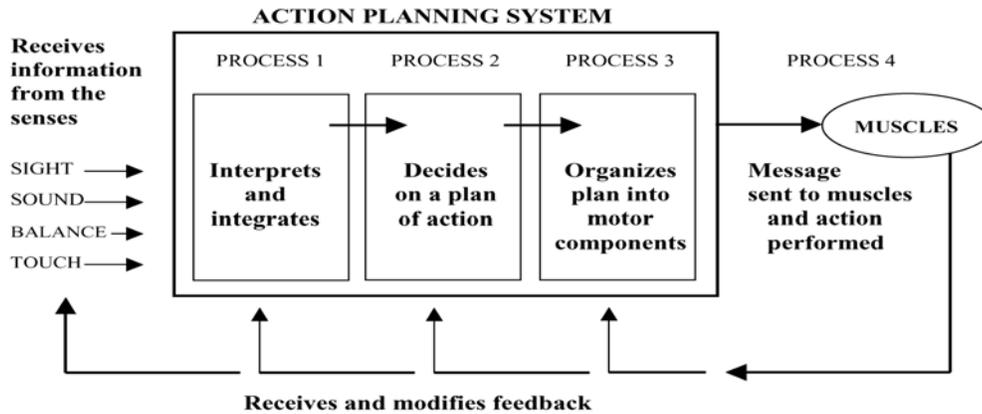


Developmental Coordination Disorder (DCD) (APA, 2000) occurs when a delay in the development of motor skills, or difficulty coordinating movements, results in a child being unable to perform everyday tasks. A diagnosis can be made by a medical doctor who will ensure: 1) that the movement problems are not due to any other known physical, neurological, or behavioural disorders; and, 2) whether more than one disorder may be present. The characteristics of children with DCD, however, are usually noticed first by those closest to the child because the motor difficulties interfere with academic achievement or with activities of daily living (e.g., dressing, playground skills, handwriting, gym activities). DCD is believed to affect 5-6% of children who are schoolaged and tends to occur more frequently in boys. DCD can exist on its own or it may be present in a child who also has learning disabilities, speech/language impairments and/or attention deficit disorder. In this booklet, the coordination difficulties that are discussed are those that are often seen in children with developmental coordination disorder.

# How Do Coordination Difficulties Occur?

There is no simple answer to this question since motor coordination difficulties may arise for many reasons. Problems can occur at a number of different stages as we process information and use it to perform skilled movement. We are constantly receiving information from our environment through various senses (see Figure 1).

Figure 1



**Process 1:** The first possibility is that the child may experience difficulty interpreting and integrating the information that is being received through vision, touch, balance, the position of joints or the movement of muscles.

**Process 2:** A second possibility is that the child has difficulty choosing the type of motor action that is appropriate for that situation. In order to select an action, a child must consider the context in which the action takes place (e.g., a child approaching a curb has to figure out that stepping up is kind of like climbing stairs).

**Process 3:** A third possibility is that the child may have difficulty forming a plan of action in the correct sequence. The child must organize the motor requirements of the task into a sequence of commands that tell the muscles how to perform the required action (e.g., when the child approaches a set of stairs, he or she must shift weight onto one leg before lifting the other).

**Process 4:** Finally, the message that is sent to the muscles must specify the speed, force, direction and distance that they are to be moved. When the child needs to move or to respond to something else that is changing in time or space (e.g., in order to catch or hit a moving ball), these messages must also change. A child may have difficulty monitoring this information or modifying the messages in order to guide and control the movement while it is taking place.

To summarize, then, a child may have difficulty analyzing sensory information from the environment, using this information to choose a desired plan of action, sequencing the individual motor movements of the task, sending the right message to produce a coordinated action, or integrating all of these things in order to control the movement while it is happening. The result of any of these problems is the same: the child will appear to be clumsy and awkward and will have difficulty learning and performing new motor tasks.

## Characteristic Features of Children with DCD

When describing children with DCD, it is important to recognize that they are a very mixed group. Some children may experience difficulties in a variety of areas while others may have problems only with specific activities. The following is a list of some of the more common characteristics that may be observed in a child with DCD.

### Physical Characteristics

1. The child may appear to be clumsy or awkward in his/her movements. S/he may bump into, spill, or knock things over.
2. The child may experience difficulty with gross motor skills (whole body), fine motor skills (using hands), or both.
3. The child may be delayed developing certain motor skills such as tricycle or bike riding, ball catching, handling a knife and fork, doing up buttons, and printing.
4. The child may show a discrepancy between his/her motor abilities and his/her abilities in other areas. For example, intellectual and language skills may be quite strong while motor skills are delayed.
5. The child may have difficulty learning new motor skills. Once learned, certain motor skills may be performed quite well while others may continue to be performed poorly.
6. The child may have more difficulty with activities that require constant changes in his/her body position or adaptation to changes in the environment (e.g., baseball, tennis or jumping rope).
7. The child may find activities that require the coordinated use of both sides of the body difficult (e.g., cutting with scissors, stride jumps, swinging a bat, or handling a hockey stick).



The Blue-footed Booby-Bird of the Galapagos Islands has personality and talent – it can fly incredibly high into the air and dive into the ocean; it can even do a very funny dance. Despite these strengths, this unique bird has a lot of trouble landing and often goes for a tumble. We selected this bird as a mascot for our DCD educational materials so they will be easy to identify and will be attractive to share with children.

8. The child may exhibit poor balance and/or may avoid activities which require balance.
9. The child may have difficulty with printing or handwriting. This skill involves continually interpreting feedback about the movements of the hand while planning new movements, and is a very difficult task for most children with DCD.

## **Emotional/Behavioural Characteristics**

1. The child may appear to be uninterested in, or to avoid, particular activities, especially those which require a physical response. For a child with DCD, motor skills are very difficult and require more effort. Repeated failure may cause the child to avoid participating in motor tasks.
2. The child may experience secondary emotional problems such as low frustration tolerance, decreased self-esteem, and lack of motivation due to problems coping with activities which are required in all aspects of his/her life.
3. The child may avoid socializing with peers, particularly on the playground. Some children will seek out younger children to play with while others will go off on their own. This may be due to decreased self-confidence or avoidance of physical activities.
4. The child may seem dissatisfied with his/her performance (e.g., erases written work, complains of performance in motor activities, shows frustration with work product).
5. The child may be resistant to changes in his/her routine or in the environment. If the child has to expend a lot of effort to plan a task, then even a small change in how it is to be performed may present a large problem for the child.

## **Other Common Characteristics**

1. The child may have difficulty balancing the need for speed with the need for accuracy. For example, handwriting may be very neat but extremely slow.
2. The child may have difficulty with academic subjects such as mathematics, spelling, or written language which require handwriting to be accurate and organized on the page.
3. The child may have difficulty with activities of daily living (e.g., dressing, using a knife and fork, folding clothes, tying shoelaces, doing up buttons and zippers, etc.).
4. The child may have difficulty completing work within a normal time frame. Since tasks require much more effort, children may be more willing to be distracted and may become frustrated with a task that should be straightforward.

5. The child may have general difficulties organizing his/her desk, locker, homework, or even the space on a page.

If a child exhibits any number of the above characteristics and if these problems are interfering with the child's ability to participate successfully at home, at school or on the playground, then it is important to have the child seen by a family doctor or paediatrician. The medical practitioner may then refer the child to a health service provider at a local children's hospital or treatment centre or to another community agency. Because the child is usually having difficulty with self-care and academic tasks, this service provider will often be an occupational therapist.

It is not uncommon for parents or teachers to be told that a child will "grow out" of this disorder (Fox & Lent, 1996; Polatajko, 1999). However, studies have now shown quite conclusively that most children do not outgrow these problems. While children do learn to perform certain motor tasks well, they will continue to have difficulty with new, age-appropriate ones. Further, they are more likely to demonstrate academic problems, poor social competence, low self-esteem and are less likely to be physically fit or to participate voluntarily in motor activities (see Missiuna, 1999 for a review of these studies).

## **The Role of the Occupational Therapist**

Occupational therapists are educated and trained in analyzing motor skill development and also in determining the ability of a child to cope with the demands and activities of everyday life. They are uniquely suited for making recommendations for the management of a child with movement problems. In today's health care environment, the occupational therapist (OT) is often primarily a consultant. In this role, the OT will observe and assess the child and then make recommendations to his/her parents and teachers. These recommendations may include: specific strategies or accommodations for handwriting and other classroom tasks; tips to make dressing and feeding easier; activities to improve the child's motor coordination; ideas for community leisure and sports activities; and setting appropriate expectations to ensure that the child experiences success.

The OT and other health service providers can help parents, teachers and the child to develop a better understanding of the coordination difficulties that the child is experiencing. It is important that parents and teachers identify and learn to manage these problems early in order to prevent secondary complications (Fox, Polatajko & Missiuna, 1995). The child may need to be taught strategies to compensate for his/her motor problems and must be given adequate opportunities to practice those motor skills that need to be learned.

It is important to educate children with DCD so they become aware of their strengths, as well as their limitations, so they gain an understanding of ways in which they may compensate for any difficulties. Children will then be more likely to experience success and may be more willing to attempt activities that they find difficult.

If a child is experiencing a lot of difficulty or is showing evidence of secondary emotional and behavioral problems, the OT may decide to work with the child individually on a short-term basis. The OT may do some direct skill teaching of motor tasks that the child needs to learn. S/he may also use a cognitive approach that teaches the child problem-solving strategies that will help the child learn any new motor task (this type of approach requires an OT to have extra training). In either case, the reasons and plan for treatment will be discussed with the parent and child. Although in most cases basic coordination difficulties do not disappear, children can show considerable improvement in their ability to perform particular tasks and can be helped to participate successfully in activities at home, at school and in the community.

## The Role of the Teacher and Parent

There are many small modifications that can make life easier for a child with DCD. Here are a few ideas that may be useful; an occupational therapist may have additional suggestions.

### At Home

1. Encourage the child to participate in games and sports that are interesting to him/her and which provide practice in, and exposure to, motor activities. Physical activity and enjoyment should be emphasized rather than proficiency or competition.
2. Try to introduce the child to new sports activities or a new playground on an individual basis, before s/he is required to manage the activity in a group. Try to review any rules and routines that are associated with the activity (e.g., baseball rules, soccer plays) at a time when the child is not concentrating on the motor aspects. Ask the child simple questions to ensure comprehension (e.g., "What do you do when you hit the ball?"). Private lessons may be helpful at certain points in time to teach the child specific skills.
3. The child may exhibit a preference for, and perform better at, individual sports (e.g., swimming, running, bicycling, skiing) rather than team sports. If this is the case, then try to encourage the child to interact with peers through other activities that are likely to be successful (e.g., cubs, music, drama, or art).
4. Encourage the child to wear clothing to school that is easy to get on and off. For example, sweat pants, sweat shirts, t-shirts, leggings, sweaters, and Velcro shoes. When possible, use Velcro closures instead of buttons, snaps or shoelaces. Teach the child how to manage difficult fasteners when you have more time and patience (e.g., on the weekend or over the summer) rather than when you are pressured to get out the door.
5. Encourage the child to participate in practical activities that will help improve his/her

ability to plan and organize motor tasks. For example, setting the table, making lunch, or organizing a knapsack. Ask questions that help the child focus on the sequence of steps (e.g., “What do you need to do first?”). Recognize that, if your child is becoming frustrated, it may be time to help or to give specific guidance and direction.

6. Recognize and reinforce the child’s strengths. Many children with DCD demonstrate strong abilities in other areas such as: advanced reading skills, creative imaginations, sensitivity to the needs of others, and/or strong oral communication skills.

## At School

Teachers and parents can work together to ensure that the child with DCD experiences success at school. Parents may find it helpful to meet with the teacher near the beginning of the school year to discuss their child’s specific difficulties and to make suggestions about strategies that have worked well. An Individualized Education Plan may be needed for some children; however, the following modifications may be sufficient for others.



### In the Classroom:

1. Ensure that the child is positioned properly to begin table work. Make sure that the child's feet are flat on the floor, that the desk is at the appropriate height, and that forearms are comfortably supported on the desk.
2. Try to set realistic short-term goals. This will ensure that both the child and teacher continue to be motivated.
3. Try to provide the child with extra time to complete fine motor activities such as math, printing, writing a story, practical science tasks, and artwork. If speed is necessary, be willing to accept a less accurate product.
4. When copying is not the emphasis, try to provide the child with prepared worksheets that will allow him/her to focus on the task. For example, provide children with prepared math sheets, pages with questions already printed, or 'fill in the blank' for reading comprehension questions. For study purposes, photocopy notes written by another child.
5. Introduce computers as early as possible to reduce the amount of handwriting that will be required in higher grades. Although keyboarding may be difficult initially, it is a very beneficial skill and is one at which children with movement problems can become quite proficient.
6. Teach children specific handwriting strategies that encourage them to print or write letters in a consistent manner. Use thin magic markers or pencil grips if they seem to help the child improve pencil grasp or to reduce pencil pressure on the page.

7. Use paper that matches the child's handwriting difficulties. For example:
  - i) Widely spaced lines for a child who writes very large;
  - ii) Raised, lined paper for a child who has trouble writing within the lines;
  - iii) Graph paper for a child whose writing is too large or improperly spaced;
  - iv) Graph paper with large squares for a child who has trouble keeping numbers aligned in mathematics.
8. Try to focus on the purpose of the lesson. If a creative story is the goal, then ignore messy handwriting, uneven spacing and multiple erasures. If the goal is to have the child learn to set up a math problem correctly, then allow time to do it even if the math problem does not get solved.
9. Consider using alternative methods of presentation in order for the child to demonstrate comprehension of a subject. For example, children may present a report orally, use drawings to illustrate their thoughts, type a story or report on the computer, record a story or exam on a tape recorder.
10. Consider allowing the child to use the computer for draft and final copies of reports, stories and other assignments. If the teacher wants to see the “non-edited” product, ask the child to submit both the draft and final versions.
11. When possible, allow the child to dictate stories, book reports, or answers to comprehension questions to the teacher, a volunteer or another child. For older children, voice recognition software can be introduced as soon as the child’s voice patterns have matured enough that they are consistent.
12. Provide additional time, and/or computer access, for tests and exams that require a lot of written output.

### **In Physical Education:**

1. Break down the gym activity into smaller parts while ensuring that each part is meaningful and achievable.
2. Try to choose activities that will ensure success for the child at least 50% of the time. Reward effort, not skill.
3. Try to incorporate activities which require a coordinated response from arms and/or legs (e.g., skipping, bouncing and catching a large ball). Also encourage children to develop skills using their hands in a dominant/assistant fashion (e.g., using a baseball bat or a hockey stick).



4. Keep the environment as predictable as possible when teaching a new skill (e.g., place a ball on a T-ball stand). Introduce changes gradually after each part of the skill has been mastered.
5. Make participation, not competition, the major goals. With fitness and skill-building activities, encourage children to compete with themselves, not others.
6. Allow the child to take on a leadership role in gym activities (e.g., captain of the team, umpire). The child may develop organizational or managerial skills that are also useful.
7. Modify equipment to decrease the stress and risk of injury to children who are learning a new skill. For example, Nerf balls in graduated sizes can be used to develop catching and throwing skills.
8. When possible, provide hand-over-hand guidance to help the child get the feel of the movement. This can be done, for example, by asking the child to help the teacher demonstrate a new skill to the class. Also, talk aloud when teaching a new skill, describing each step clearly.
9. Focus on understanding the purpose and the rules of various sports or physical activities. When a child understands clearly what s/he needs to do, it is easier to plan the movement.
10. Give positive, encouraging feedback whenever possible. If providing instruction, describe the movement changes specifically (e.g., you need to lift your arms higher).

## Summary

Developmental Coordination Disorder is a motor skill disorder that interferes with children's ability to perform many tasks that are required each and every day. Children with DCD are a heterogeneous group. Any given child may present with a variety of different problems.

Teachers and parents who are with a child every day may be the first to notice the functional difficulties that the child is experiencing. It is important for the child to be seen by a physician at an early age in order to rule out other medical reasons for the clumsiness. Children with DCD who are not recognized may experience failure and frustration, are often perceived to be lazy or unmotivated, and may develop secondary complications such as learning difficulties, emotional, social and behavioural problems.

Intervention for children with DCD may include referral to an occupational therapist or other service providers. An occupational therapist will help the child learn to perform many daily tasks more successfully. The occupational therapist may also make recommendations to parents and teachers regarding the participation of children with DCD at home, in the classroom and in leisure activities in the community.

Contrary to the widely accepted belief that children with DCD will outgrow their problems, studies have demonstrated that children may acquire certain skills with extra practice but new motor skills will still be a problem. Children with DCD require early intervention to help them learn strategies to compensate for their coordination difficulties and to feel better about themselves as individuals.

## References

*The term Developmental Coordination Disorder (DCD) has only recently received the attention and acceptance of practitioners and researchers in health care and educational fields. Other terms that may be used include "clumsy", "dyspraxic" and "physically awkward children". Very little has been published about children with DCD in professional journals and even less has been written in the popular press or parenting magazines. The following references may be helpful:*

American Psychiatric Association (2000). Category 315.4. Developmental coordination disorder. *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. Text revision), 56-58. Washington, DC: Author. (provides diagnostic information)

Cocks, N. (1996). *Watch me, I can do it! Helping children overcome clumsy and uncoordinated motor skills*. Sydney: Simon & Schuster.

Cermak, S., & Larkin, D. (2002). *Developmental coordination disorder*. Albany, NY: Delmar. (can be ordered through [www.delmar.com](http://www.delmar.com))

Fox, A. M., & Lent, B. (1996). Clumsy children: Primer on developmental coordination disorder. *Canadian Family Physician*, 42, 1965-1971.

\* Missiuna, C., (1999). *Keeping current on "Children with fine motor difficulties"*. Hamilton, ON: CanChild. (available at [www.canchild.ca](http://www.canchild.ca))

\* Missiuna, C. (1996). *Keeping current on "Developmental Coordination Disorder"*. Hamilton, ON: CanChild. (available at [www.canchild.ca](http://www.canchild.ca))

Missiuna, C., & Polatajko, H. (1995). Developmental dyspraxia by any other name ... Are they all just clumsy children? *American Journal of Occupational Therapy*, 49, 619-627.

Polatajko, H. J. (1999). Developmental coordination disorder (DCD): Alias the clumsy child syndrome. In K. Whitmore, H. Hart, & G. Willems (Eds.), *A neurodevelopmental approach to specific learning disorders*. Clinics in Developmental Medicine, 45 (pp. 119-133). London: Mac Keith Press.

Polatajko, H. J., Fox, A.M., & Missiuna, C. (1995). An international consensus on

children with developmental coordination disorder. *Canadian Journal of Occupational Therapy*, 62, 3-6.

*Complete Journal Issues on Developmental Coordination Disorder:*

- Physical and Occupational Therapy in Pediatrics (2001), Volume 20(2/3).
- Human Movement Science (2001), Volume 20 and (1998), Volume 17(4-5).
- Australian Educational and Developmental Psychologist (1997), Volume 14(1).
- Adapted Physical Activity Quarterly (1994), Volume 11(2).

*\*All **Keeping Current** documents, other educational materials about DCD and copies of this booklet are available on the **CanChild** website or by contacting CanChild.*

*If you have found this booklet to be helpful, please let us know:*



McMaster University  
1400 Main St. West, IAHS 408  
Hamilton, ON  
L8S 1C7  
Tel: (905)525-9140 ext. 27850  
[www.fhs.mcmaster.ca/canchild](http://www.fhs.mcmaster.ca/canchild)