

Physical Development

This chapter will set out some developmental steps in basic language, so that a simple framework of growth steps and changes can be established. At the same time, it is important to note that growth and physical developmental steps do not all occur at set, programmed ages and in accordance with set timetables. Each child is an individual, and genetic, nutritional and environmental aspects are influential. Progress is made at different speeds and rates; there can be plateaux and retrograde steps. Development can be seen as a road along which *all* children travel, yet they do not all travel and make progress at the same speed and some children may pause at times and/or take detours along the way.

The whole child

The term 'physical development' provides several difficulties and complexities as one attempts to unravel it. 'Physical' sounds simple, relating to the body, and 'development' implies progress which is linear and incremental: it sounds a deceptively simple area for study.

However, as has been outlined in the Introduction, the physical being and physical growth cannot be

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separated from the emotional, social, psychological whole person. Physical growth and development cannot be sectioned off and viewed as forming one particular entity; basic body management, control and competence affect confidence and all interaction with the environment and with other people. This means that the physical aspects of learning cannot be placed in one curricular 'box'.

Furthermore, although human growth and developmental stages and steps *do* follow a sequential pattern, the physical changes and progress of the human child cannot be simplistically related to age (Gallahue and Ozmun 1998). Where one child may walk at ten months, another may not walk until over sixteen months old.

Nevertheless, it is helpful for practitioners to have a concept of the basic growth patterns and developmental steps that occur, along with an approximate chronology. These milestones can provide useful knowledge as a baseline guide or yardstick so that practitioners can plan learning experiences for children which are appropriate and which match developmental levels.

Practitioners also need to know how physical skills are acquired and developed in order to break down skills into appropriate, attainable sub-skills and plan the next learning step. This understanding of how the body develops and acquires motor competence is vital so that practitioners do not present children with movement and manipulative tasks which are impossibly difficult and inappropriate for their developmental level. Similarly, children should not be under-challenged.

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Practitioners can also view progress or delay against broad 'norms' (Sheridan 1995) and some motor difficulties may thus be identified in certain cases where children fail to meet the expected milestones. Experienced practitioners will know when to allay fears of parents regarding a child's difficulties or when to recommend consulting appropriate medical professionals.

A sound knowledge of these developmental milestones and the patterns of growth will form an underpinning framework for practitioners as they gain experience in practical work with children.

Patterns of growth

The neonate, or new-born, arrives in the world as an active learner, ready to survive and to begin functioning in the world outside the womb. The baby is dependent upon an adult for food and care. The length of a new-born baby is approximately half a metre and the baby's head is large, roughly a quarter of the length of the body. The bones of the skull are comparatively soft and flexible and there is incomplete fusion of the skull at the top of the baby's head (the *anterior fontanelle*) which can aid passage through the birth canal. In the first months of life the baby grows in length and weight and the brain and sensory systems develop rapidly (Keenan 2002).

Some basic and invariable patterns are present in maturation and growth in infants, as can be seen in *cephalocaudal* and *proximodistal* development.

In cephalocaudal (meaning literally, development, 'head to tail') maturation and growth occur in a head

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to toe direction. In the womb, the head and major organs develop before the limbs and extremities. After birth the head of the infant is large and the brain is relatively developed; gradually the body grows and develops in strength, then later, the limbs. Similarly, in movement terms, the child first gains control in lifting up his head, then gradually he develops the strength to sit. After sitting, the child begins to develop the skills and strength to crawl. A head-body-limbs pattern of strength and mastery can be seen.

In proximodistal (meaning literally, development, 'from near to far') the maturational changes, growth and strength occur from the centre of the body outwards. Cell, nerve and organ development is more complete in the centre of the body, the trunk, before the extremities. The infant acquires control (as a result of growth and increased strength) in the neck and centre of the body before control develops in the fingers and the toes (extremities).

Growth spurts

Rapid spurts of growth occur in infancy and in puberty. During the middle childhood period, from seven to ten years approximately, growth is more steady. The chubby infant physique, with its very large head, changes through the toddler years. The body and limbs elongate after the third year, through into early and mid-childhood. The child will become taller and the head will not appear so large in comparison with the rest of the body. This is because the bones and muscles in the legs have grown in length and strength.

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Milestones of development and movement

The following sections show broad, age-related expectations for the developing child. As already stressed, all children make individual progress and take individual steps along this road. As well as genetic makeup (plus patterns of physical growth and sensory maturation), the environment in which the child is living and growing affects development.

The new-born baby

Cameo

Baby Henry is one week old. His proud parents have already realized that Henry can wriggle and move and make his requirements known. He has differing types of cry which can indicate different needs, for example, when he wakes, if he is hungry or if he is uncomfortable or wet. He can curl his fingers around his father's finger. He can wave his arms and legs. Henry seems to know when his parents come into the room and when his mother is holding him he can gaze into her face. He seems able to copy facial expressions and appears to smile. He opens his mouth when his cheek is touched. He is already making his presence felt in this new world, with two adults at his beck and call!

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The new-born baby is not an entirely passive, helpless being, as Henry's cameo shows. The new baby is an active learner as he experiences his environment through a range of senses. Some of the things Henry does are in reality reflex actions, which can be misinterpreted by parents as examples of precocious development. These reflex actions are inherent survival actions and are also the precursors to planned, voluntary movements. Several automatic reflex actions are present in the new-born baby, some of which disappear in the first weeks and months and others which remain throughout life. When a baby is touched on the cheek he will turn towards the touch to feed: this is the rooting, sucking reflex and is an example of a reflex action which disappears. The eye blink reflex (when an object approaches the eye, it reflexively blinks) is an example of a reflex action which is present at three months and remains throughout life (Cratty 1986).

Reflex actions cannot be controlled, they just happen. The new baby will show several touch response reflexes (rooting, sucking, grasping) and will show a startle reflex to sudden, loud noise. The rooting and sucking reflex actions occur when the baby is placed close to the mother's breast. The grasp reflex occurs when an adult finger is placed on the baby's palm and the baby's fingers close and grip.

Movement *self-righting* and muscle tone reflexes are present: if the baby is placed on his back and the head is turned, the trunk will turn towards the side that the head is facing; if the hips are turned one way the head will turn towards the same direction. These neck and body righting

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reflexes can be said to be the body attempting to keep itself the *right* way up, a survival reflex action. New-born babies also exhibit reflexive breath holding and can 'swim' underwater, although not many parents would wish to test this reflex! These early reflexes are thought to be life-saving mechanisms (Cratty *ibid.*).

In the first weeks the baby can hear and 'see' close objects and can mirror facial expressions. He 'speaks' by crying and making some soft grunting sounds. He will sleep for many hours of the day. The new-born baby cannot lift up his head, roll over, reach or sit up. His muscles do not yet have anti-gravity strength.

In the first weeks and months

Some of the reflex actions disappear during the first weeks of life. The baby's head needs to be supported at all times, but, around the second month, the baby develops the labyrinthine righting reflex where there is the tendency and strength in the neck to lift the head upright against gravity even if the body is angled downward. This can be seen as a precursor to balance. If a baby exhibits a 'floppy' head at this stage it can be an indication of neurological problems and later movement difficulties. Similarly, excessive rigidity of tone of muscles (spasm) can indicate motor/movement and neurological problems. Health visitors and other medical practitioners are alert to these indications. Throughout life, extremes of poor muscle tone and rigidity continue to be possible indicators of motor problems (Cocks 1992).

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In the first few weeks and months, if the baby is held out above the ground he will move his limbs in reflex actions of stepping, walking, crawling, climbing and swimming movements. He cannot *really* walk, crawl or swim, but these actions seem to be programmed into the baby.

Cratty (1986, p. 112) suggests that 'the presence of these interesting reflexes indicates how deeply locomotor activities are ingrained within the human nervous system.' This walking in the air disappears after three weeks of age and actual, real walking does not occur until between nine and eighteen months. The baby also carries out spontaneous movement: he will kick his legs, bounce, wave and flap his arms, and close his fingers. These movements are the baby's spontaneous exercise and rehearsals for real movement and show that the human body is made to move, to be dynamic.

Between three and six months

The baby is much stronger and more alert. He can track objects with his eyes. Muscle strength against gravity is increasing and the baby seems to strive to hold up his head. Between four and six months he can turn over, reach for objects and hold them, using a palmar grasp which is not a reflex. He can sit if supported. He may have some first teeth by now. His 'exercising' continues and he seems to enjoy moving and kicking. In order to develop true movement (lifting limbs) and to achieve stability (holding stillness) and balance he has to defeat gravity.

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Between seven months and one year

Between seven and nine months the muscle strength needed to overcome gravity is increasing. This means having strength to lift parts of the body from the ground. The child is by no means supine any longer. He begins to creep, crawl and shuffle around the space at increasing speeds and can sit unsupported. He has increased trunk and limb strength and can pull himself up to a standing position by holding furniture. He will also begin to walk, again using furniture or parental assistance as support. Balance skill and strength are only just beginning to develop and he will fall back down onto his bottom if support is released. Crawling and walking are very important landmark skills as both involve oppositional movement (left hand, right leg; right hand, left leg) – what Dennison and Dennison (1994, p. 3) call 'bilateral movement skills'.

During this period the child begins to hold objects with finger and thumb. This is known as the pincer grasp or grip, and is much more sophisticated in sensory-motor terms than the reflex grasp of the new-born baby or the palmar grasp, as it indicates the first development of fine motor skills as well as a will to hold, examine and explore. The child will lean forward to reach objects and toys, and objects for exploration are frequently placed in the mouth.

At around twelve months old the child will show the beginnings of walking unaided.

Cameo

Bethan is thirteen months old. To the delight of her parents she has taken her first steps unaided. When she walks across the room Bethan appears to be really concentrating. She leans forward and lifts each leg quite high. She steps down with each foot in a purposeful manner. Her balance is precarious. She walks between furniture supports and sometimes she loses her balance and sits down rather abruptly onto her bottom. At other times she seems to be overcome by her own success and momentum and hurries on to the next piece of furniture. If her parents hold her hands her balance seems to be improved and if the other parent waits with arms outstretched Bethan can hurry across the space. She can manage to cross increasing areas of the room unaided and can be seen to sway and catch her balance at times. At other times she tips forward onto her hands. Bethan enjoys the activity and the praise of her parents.

Bethan has reached a major movement milestone and she shows some of the features and the difficulties of early walking. The skill of walking, in terms of motor skill and co-ordination, is very complicated and involves balancing, going off balance and then recapturing balance, the child adjusting stability all the time. Becoming vertical, standing and

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walking require a shift in the centre of gravity (Bee 1995) and unaided walking requires time for the skill to become consolidated. The movements are slow and exaggerated. Speed and balance improve in the next few months.

Between one year and eighteen months

Skills in standing supported and in beginning to walk are now becoming more efficient. By sixteen months most children can walk short distances and can crawl up steps. As balance improves, the walking may be stopped by the child himself, by losing balance backwards or forwards in a premeditated fashion rather than simply falling onto his bottom. The child can manipulate toys, passing them from one hand to the other and holding with one hand and feeling with the other (Thelen 1995). He can drop toys and track them visually on the floor. The child enjoys using sounds and beginning language, knows his own name and can respond to it and to some words.

Up to and around two years

The child becomes much more inquisitive, and confidence in movement skill is increasing. The child enjoys movement and explores new ways to travel in space, around, over and under furniture and up steps and stairs. He still takes time to establish his balance. The child will climb stairs by putting one foot then the other on the same step. He may come down by sitting down on each stair or he may descend backwards, again putting both feet onto the step.

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Between two and three years of age the child begins to travel with speed, almost running. He will jump from one step onto the ground with two feet. He may be able to use his hands to send a ball up in the air and will also try to direct a ball with his feet. He may have the manipulative skill, control and co-ordination to be able to stack a small tower of bricks. He can also scribble on paper using the hand he favours. Independent eating and drinking skills are improving and all of his first teeth may be through. The child is developing control over bowel movements. Between two and three years of age the child becomes aware that he is a boy, not a girl. This is known as developing gender identity (Smith *et al.* 2003, p. 187). At this stage the child can show signs of will and determination and will not understand sharing. He will play *near* other children, but not play *with* them. This is often referred to as 'parallel play' (Parten 1933, quoted in Curtis and O'Hagan 2003, p. 117).

Between three to five years

The child becomes more proficient in basic travelling and manipulating. Speed of movement, co-ordination and reaction are all improving as the child exhibits immature running, a kind of hurried trotting, at around three years of age, which lacks the true period of suspension from one leg to the other of mature running. He can jump from the ground and from a step, landing well on two feet, and he can stand on one leg for a short period of time, showing the beginnings of balance. He will enjoy hopping,

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springing and bending down and looking through his legs at an upside down version of his world. Between these years the child will become more adventurous, enjoying climbing and experiencing swinging and being upside down (with appropriate adult support). He will become more confident at pushing and eventually riding on wheeled vehicles.

Both fine and gross motor skills develop as the child explores his world and the objects in it. Around four years of age the child begins to develop gender stability (Kohlberg 1966, in Harris and Butterworth 2002, p. 220); he can state the gender label of another person or a picture, but may become confused if, for example, a girl is dressed in boys' clothes.

The child's dressing skills improve with encouragement and he will be able to put on and take off some clothes and shoes, but will still need help with sleeves, buttons and fasteners and may continue to do so for the next few years. The ability to tie shoelaces successfully, for example, is one of the most complex motor and perceptual skill operations a human ever learns.

During this stage of development, confidence and enjoyment in moving and playing are evident. The child explores and experiments with a whole range of ways of moving and travelling, and running shows increasing elevation. Both fine and gross motor skills become more fluent and practised. Co-ordination improves rapidly and perceptual skills come into play as the child navigates around objects and furniture with increasing speed and agility. The child seems to be full of energy – kinetic energy, the energy to move.

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Between the ages of three and five years there are increasing opportunities for exercise and acquisition of movement skills as the child meets new places, new people and new environments presented by the education system (playgroup, nursery, foundation/reception units, and infant school). These new adventures present emotional as well as physical challenges. It is not uncommon for the speech and movement skills of children to go back to toddler level at times of challenge and insecurity. The child seems to do this 'on purpose', and it is a very real plea for attention and security. It is essential for carers and practitioners to notice and praise achievement and to make sure that the new environment makes the child feel as secure as possible. Security will aid self-esteem and confidence, both of which are necessary for the child to take on new experiences, games and people. As these experiences are encountered, the perceptual and motor skills are exercised and enhanced. Meeting other children can mean that comparison and competition enter the arena.

Between six and eight years

Between six and eight years of age, the child is becoming used to a more formalized system of learning and to meeting differing challenges. At this stage the child has mastery of basic locomotive (travelling) and manipulative skills. Both fine and gross motor skills are developing and the child will show an inclination to practise and repeat moves. Left- or right-handedness is usually established by the age of six (Maude 2001, p. 11) and the dominance of one hand

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over the other is important in motor skill terms: in effect the child develops bilateral skills, through which one hand can support while the dominant hand carries out more intricate operations. Before developing a favourite hand, the child may not cross the mid-line of the body to pick up items. Delay in developing hand dominance and bilateral skill can be an indicator for other motor skill problems. The child will also develop a favourite foot, and this usually matches the dominant hand (Maude *ibid.*). From the age of six years the child reaches the stage of gender constancy; he knows that gender remains consistent regardless of clothing, situation or time (Harris and Butterworth 2002, p. 220).

At this stage the child is taller and much stronger and can apply longer periods of concentration to tasks. Sending, receiving (precursors to catching, throwing and kicking) and object management skills are improving as the child becomes used to moving in space with other children and with an object (ball, bean bag, bat, rope). The child can listen to instructions and simple coaching points and carry them out. This is the period when practitioners should continue to provide task challenges and also introduce more directed skills teaching. It is the stage at which big differences in movement competence between children become evident, and the children themselves are very aware of this.

Summary

This chapter has outlined development in terms of the patterns of growth and the main movement and

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Birth–first weeks	Reflex actions: rooting, grasping.
3–6 months	Strives to lift head, can turn over and sit supported.
6–8 months	Can sit unsupported, able to transfer objects from hand to hand.
8–12 months	Creeping, crawling, pulls up to stand, walks with help.
12–18 months	Walks unaided, climbs furniture, creeps backwards down steps.
2–3 years	Fine motor skills improving, explores travelling, climbs up and down stairs.
3–4 years	Can run and stop, tiptoe, come downstairs one step at a time.
4–5 years	Explores travelling and speeds, can hop, jump and ride a tricycle.
6–8 years	Explores range of travelling, balancing, fine motor tasks, games and equipment; sending and receiving develops into catching, throwing, kicking.

Table 1.1 Main movement milestones

developmental milestones from birth to eight years. For ease of reference these milestones are summarized in Table 1.1.

The importance of practitioners having a secure knowledge and understanding of these aspects is stressed in the SPEEL (Study of Pedagogical Effectiveness in Early Learning) Research Project Framework.

Overwhelmingly, early years managers/head-teachers and practitioners see knowledge of child development and, in particular, children's

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learning as fundamental to effective teaching and learning.

Moyles *et al.* (2002, Introduction)

The beneficial aspects of good, appropriate practice form a two-way process: activities which match the developmental level of the child can consolidate and extend learning, whilst appropriate stimulation, interaction, action and challenge aid development. The child learns through engagement in movement and through his senses, and at the same time his movement and sensory skills are enhanced.

In an impoverished environment, lacking toys, space, adult attention and praise and adequate nutrition the child will fail to thrive and overall development and growth will be retarded. Movement is essential for healthy development and it is the medium for learning.

As the young child grows and gains in confidence and muscular strength he is very rarely still for long periods unless he is asleep. This world of action is a world for learning. The small baby's movements and sounds are his exercise systems and preparation for language. He explores the world through his senses. The young child, upright, mobile and active, continues this exploration. Play is his learning and exercise system: active play is the 'work-out' of the young child, this little learning machine.