Chapter 7

THE OCCUPATIONAL DEVELOPMENT OF CHILDREN[1]

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Paediatric occupational therapists are keenly interested in human development. Their knowledge of development is fundamental to their practice. Guided by their understanding of normal growth and development they make determinations about the developmental status of a child, the need for and nature of intervention. Paediatric occupational therapists are interested in how a child's growth and development will support their mastery of the occupational world.

Human development has been the focus of study for over a century, leading to a rich and broad literature of the changes humans experience from conception to old age. The vast majority of this literature focuses on the ages and stages through which an individual progresses across the lifespan in specific domains, such as cognitive (Piaget, 1969) and psychosocial development (Erikson, 1950). This literature is essentially devoid of specific information on occupational development, leaving the therapist to infer its course. This is no easy task.

Occupational behaviour is complex. Whether it is discussed in terms of human occupation (Kielhofner, 2002), occupational competence (Polatajko, 1992), or occupational performance (Baum & Christiansen, 2005; Canadian Association of Occupational Therapists (CAOT), 1997), it is considered that the source of occupational behaviour is the interaction of three factors: person, occupation and environment. Since the developmental literature pertains to the person, it is relevant to occupational development; however, on its own it is insufficient.

Occupational development is not only influenced by the developmental status of the person, but also by the demands of the occupation in question and the relevant environmental supports and barriers. For example, when determining a child's readiness to ride a bicycle we must consider not only the physical stature of the child, the child's motor, cognitive and attentional skills, awareness of safety issues and eagerness to ride, but also the style and dimensions of the bike, the neighbourhood in which it will be ridden and parental expectations.

[1] Parts of this chapter have been adapted from J. A. Davis & H. J. Polatajko (2004). Occupational development. In: C. Christiansen & E. A. Townsend (Eds.). *Introduction to occupation: the art and science of living*. Upper Saddle River, NJ: Pearson Education. Reproduced with permission.

Occupational development results from the interaction of human beings with their environments. This interaction makes occupational development extremely complex. Therefore it is very difficult for the therapist to predict the course of occupational development from knowledge of person development alone.

The purpose of this chapter is to provide a model to guide therapists in enabling children's optimum occupational development. We will:

(1) Define occupational development
(2) Situate it among and distinguish it from other forms of human development
(3) Present the Interactional model of occupational development (IMOD)
(4) Describe the principles of interactionism and their implications for practice

Occupational development defined

From birth we begin to build our occupational selves. An individual's occupational repertoire is not static but changes throughout life. The progression of change, when characterized by a sequence of ages and stages across the lifespan, is referred to as development. Occupational development has been defined as 'the gradual change in occupational behaviours over time, resulting from the growth and maturation of the individual in interaction with the environment' (CAOT, 1997, p. 40). This definition can be understood in three ways.

First, the gradual change in occupational behaviours can be understood in terms of occupational competence – that is, the progression from novice to mastery, in the performance of given occupation/s. From this perspective occupational development is considered at the *level of the occupation*, with a beginning, a progression, and an endpoint; the expectation being that a child moves through this progression at a rate and in a sequence specific to the occupation. For instance, a child begins to walk by taking a first step, then another, and after a number of tumbles and more practice the child masters walking. Occupational development is an iterative process, with the progression from novice to mastery repeated again and again, with the addition of each new occupation.

Second, the gradual change can also be understood in terms of an individual's occupational repertoire – that is, the set of occupations an individual has at a specific point in the life course. From this perspective, occupational development is considered at the *level of the individual*, with changes having multiple patterns and no specific endpoint. Rather, occupational repertoires change continuously throughout the lifespan, sometimes expanding, sometimes shrinking. There is no a priori determination of the number or specifics of the occupations that constitute an individual's repertoire, either at a particular point in time or across the life course. However, it is anticipated that a repertoire will develop, and that the development is in keeping with the individual's growth and development, and will continue throughout the life course.

Third, gradual change in occupational behaviours can be understood in terms of humankind's occupational possibilities – that is, the set of occupations that exist

at any given point in time or place across human evolution. From this perspective, occupational development is considered at *the level of the species* with change occurring constantly across evolution. As with development at the level of the individual, there is no a priori determination of the number or specifics of the occupations that the species will have at any given point in time or place. It is simply anticipated that there will be a continuous development of a large variety of occupations, and that the development is in keeping with the species' needs and possibilities.

Taking all three levels together, occupational development is defined as the systematic process of change in occupational behaviours across time, at the level of occupation, individual and species. At the level of the individual, occupational development is the systematic process of change whereby the individual comes to know the occupational world and becomes competent within it. This will be the primary focus of this chapter.

Occupational development: situated among and distinct from other forms of development

Development is generally described as the ages and stages through which an individual progresses across the lifespan in such domains as cognition, language, perceptual-motor skills and psychosocial behaviour. Historically, there have been four perspectives on how development occurs: preformationist, maturationist, environmentalist and interactionist. The oldest, the *preformationist* view, popular in the Middle Ages, held that children were miniature adults (Aries, 1962) born with all their lifetime characteristics, including body shape and personality, in place. This was moderated by the *maturationist* view which held that heredity dictated what a person was to become; that development was a matter of nature. In the 1700s, John Locke introduced the idea that the individual was born as a tabula rasa (empty slate) and that life experiences alone shaped development. The introduction of this environmentalist view, with its perspective that environment alone impacts development, heralded the nature/nurture debate, which raged for a significant portion of the twentieth century. These opposing views were brought together in the interactionist view, which holds that development occurs as a result of the interaction of nature and nurture.

Interactionism is built on the premise that there is a reciprocal interactive relationship between people and their environments that determines the course of development. Thus, the changes observed to occur across time, are the expression of '. . . progressive, mutual accommodation, throughout the lifespan, between a growing human organism and the changing immediate environments in which it lives . . .' (Bronfenbrenner, 1977, p. 514). The nature/nurture question is no longer concerned with determining which one drives development, rather with understanding how they interact to produce the developmental changes humans experience.

The evidence being accumulated, suggests that the interaction between the developing individual and the environment, between nature and nurture, is not simply additive (Plomin, 1994), but operates in complex ways. Interesting work is

emerging, describing this interaction. For example, Macnab (2003) applied multi-stage generalized linear regression to data from the National longitudinal survey of children and youth of Canada. She found a variety of direct and indirect (mediated) effects, (for example neonatal status and family environment), each contributing directly and independently to school-age competence. She also found that positive parenting was a direct contributor to outcome while hostile/ineffective parenting mediated the association between preschool behaviour and school competence.

The nature of the interaction between nurture and nature, and their relative contribution to development, is domain specific. For example, heredity has a large (almost exclusive) role in eye colour, less in cognitive development and perhaps least in moral development. Further, there is a dynamic interaction between the domains themselves (Cole & Cole, 1996), with physical, cognitive, psychosocial and moral each affecting the other. This is particularly the case for occupational development.

At the level of the individual, the systematic change in occupational behaviour occurring over time results in the individual's active participation in the world, through occupation. From the *International classification of functioning, disability and health* (ICF) (WHO, 2001), it can be seen that the status of the individual is only one determinant; person factors interact with environmental factors in complex, multidirectional ways.

Micro-occupational development: developing occupational competence

The most frequently discussed level of occupational development is development of competence in a single occupation, or in the component skills that subtend occupational competence (for example mature grasp). The key focus of micro-occupational development is on how domain specific development establishes the capacity for occupational performance. Much of the developmental literature describes the occupations that can be expected at various ages and stages and the skills required for their performance. Frequently, the behaviours noted for each age and stage are occupational in nature. The infant explores objects in many different ways, mouthing, banging, dropping and throwing. The toddler develops independence in self-care tasks such as self-feeding and hand washing. The preschooler rides a tricycle.

There have been some attempts made to theorize the development of occupational competence in children. Case-Smith (2005) created a model of the development of child occupations, which is conceptualized as the interaction among individual abilities, occupations and environments. She used this model as an outline to discuss the qualitative changes in the play occupations of children during infancy, early and middle childhood. She discussed the child's development in the cognitive, psychosocial and sensorimotor domains, and how these interact with the play environment, describing children's developing occupational competence in play (see Table 7.1).

Humphry (2002) drew on dynamic systems theory to create a model of developmental processes, which explicates the interaction between person and environment

Table 7.1 Development of play occupations: 0 to 10 years.

Age/stage	Developing competence in and through play
Infancy/toddlers	
0 to 6 months	*Exploratory play* – grasps, mouths and examines objects *Social play* – smiles and coos
6 to 12 months	*Functional play* – rolls a ball; pushes a car in a track *Social play* – imitates simple gestures
12 to 18 months	*Functional play* – pretends to eat; stacks blocks, scribbles with a crayon *Gross motor play* – explores all spaces in room *Social play* – begins peer interaction
18 to 24 months	*Functional play* – strings beads; turns pages of a book; draws circles with crayon *Pretend/symbolic play* – feeds baby doll; uses play hammer *Gross motor play* – sits on and pushes ride-on toys; climbs on jungle gyms *Social play* – participates in groups of children
Early childhood	
24 to 36 months	*Symbolic play* – bathes doll then dresses it in pyjamas and puts it to bed *Constructive play* – builds puzzles; colours in pictures *Gross motor play* – jumps; rough and tumble play; rides tricycle *Social play* – takes turns; plays with peers
3 to 4 years	*Complex imaginary play* – acts out roles and uses abstract objects in scripted play *Constructive play* – cuts out simple shapes; draws a face *Rough and tumble play* – does playground activities; runs *Social play* – participates in circle time, games, art time with peers
4 to 5 years	*Games with rules* – participates in simple games, such as, 'duck, duck, goose' *Constructive play* – builds complex block structures; builds ten-piece puzzle *Social play/dramatic play* – plays 'dress up' with peers; tells stories
5 to 6 years	*Games with rules* – plays board and computer games *Dramatic play* – role plays real world stories *Sports* – participates in ball play *Social play* – plays games with friends; enjoys singing and dancing
Middle childhood	
6 to 10 years	*Games with rules* – plays computer and card games that require abstract thinking *Crafts and hobbies* – has hobbies such as drawing; collects stamps, coins, dolls *Organized sports* – competes in sports, such as soccer/football, basketball, hockey *Social play* – talks and jokes with friends; belongs to clubs, such as choir, scouts and guides

Based on information found in Case-Smith (2005).

in developing occupational competence. She identified four fundamental aspects of occupational development:

(1) Intentional actions
(2) Mechanisms for generating occupational behaviours
(3) Socio-cultural niche – children are more inclined to imitate culturally relevant occupations
(4) Engagement in occupation as conditions for developmental changes

Edwards & Christiansen (2005) discussed occupation as both a product of development and a facilitator of the process of development. Growth, maturation and learning are three key factors in development. Occupation and the domains of development act in a reciprocal, interactive manner to further changes in the individual across the lifespan. Occupational behaviour shapes development and vice versa. They identified theorists whose work can inform our understanding of occupational behaviour changes across the lifespan: Freud, Piaget, Kohlberg, Havighurst, Erikson, Levinson, Watson, Bandura and Baltes. The work of each theorist is proposed to contribute to our understanding of micro-level occupational development. However, these theories tend to overemphasize the association between intrinsic changes of the individual and the development of new behaviours, and therefore are inadequate to explain fully the complexities of occupational development at the other levels, that is, meso- and macro-levels.

Meso-occupational development: developing an occupational life course

The constellation of occupations an individual accumulates across the lifespan, their life course occupational repertoire, represents the meso-level. Marked by the changes in the specific occupations that an individual can and does perform over the course of life, meso-occupational development is governed by the principles underlying the occupational trajectories and transitions that occur across the life course, and the process whereby these occur. Davis & Polatajko (2004) combined knowledge from sociology, human geography, anthropology and psychology to create an interactionist perspective on occupational development.

The interactional model of occupational development (IMOD)

The IMOD describes the nature of the change across the life course, whereby the individual comes to know and become competent in the occupational world. The IMOD holds that the systematic change in occupational behaviours, across time, is the outcome of the interactions of persons with their occupations in the context of their environments. The IMOD is based on the premise that since interactionism underlies both individual development and occupational behaviour, it is a key

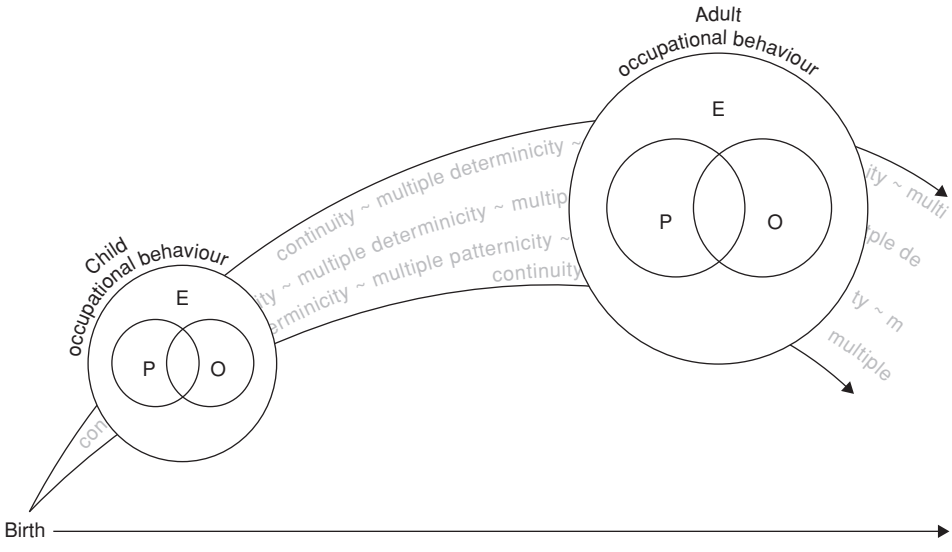

Figure 7.1 Interactional model of occupational development.

mechanism of occupational development. The three variables of interactional occupational development are:

(1) Occupational behaviour is defined as the interaction of the person and occupation in the context of the environment
(2) Time, referring to the lifespan of an individual, many of which comprise the span of human evolution
(3) Interaction between occupational behaviour and time (see Figure 7.1)

The first is depicted as three circles composed of two intersecting circles, representing person and occupation, inside a third circle, which represents the environmental context. Growth and development are represented by the expanding arc in which the principles of interactionism appear as a backdrop. The occupational behaviour circles are shown at points in time, the one on the right larger than the one on the left, indicating growth and development, over time. The meter for time in the figure is the individual life course, the meso-level of occupational development.

Evidence for the IMOD has existed for some time. The story from the 1790s of Victor, in *The Wild Boy of Aveyron* (Itard, 1962), depicts the pervasive negative effect on all aspects of development from being raised apart from civilization. The more recent story of Genie, a young girl who was confined to a crib for most of her 13 years (Curtiss, 1977), shows a similar negative developmental effect from severe prolonged deprivation. The stories from Romanian orphanages have demonstrated that less severe deprivation of shorter duration also has detrimental effects on development. However, these experiences also demonstrate that the effects are influenced by the duration of the deprivation and can be reversed

through exposure to richer occupational environments (Rutter et al., 1998). These observations provide supporting evidence for the interactional nature of occupational development. Further, they suggest that classic stage theory alone, is not sufficient to account for occupational development.

The principles of interactionism[2]

Many domains of human development are governed by classical stage theory. This makes it possible not only to describe an individual's stage of development, but also to predict what will come next. For example, Piaget's stages of cognitive development can be used to describe the level of development of a particular individual, describe it as normal, advanced, or delayed and even predict what is likely to happen next. Because occupational development is the result not only of the growth and development of the person but also of their occupations and environments, it is not governed by stage theory alone.

Stage theory applies to occupational development only to the extent that it governs the development of the person; it does not govern the development of the person's occupation or environment. Consequently, stage theory is of considerable value when considering the development of occupational competence, at least in children, but is of much less value when considering the development of an individual's occupational repertoire and of even less value when considering the development of the species' occupations across evolution. Drawing from lifespan development (Baltes, 1987; 1997; Baltes et al., 1999), life course (Elder, 1998; 1999) and ageing literature (Atchley, 1999), three principles have applicability to the interactional development of human occupation: staged continuity, multiple determinicity and multiple patternicity.

Staged continuity

Staged continuity, originally referred to as continuity by Davis & Polatajko (2004), holds that the development of a life course occupational repertoire is a continuous process of accumulation of occupational behaviours commencing at birth. It is influenced by the ages and stages of human development, but no specific age or stage is dominant. It is based on continuity theory (Atchley, 1999), which asserts that development does not end in childhood; rather, adults continue to adapt to changes in themselves and their life situations throughout the lifespan. Staged continuity combines the concepts of classic stage and continuity theory, acknowledging the influence of development on the interaction among person, occupation and environment.

The changes in occupational behaviour across the lifespan are influenced by developmental changes. Thus, it can be expected that the infant will lie on their back

[2] Parts of this section are taken and/or adapted from Davis & Polatajko, 2004, pp. 97–109.

mouthing objects; the toddler will cruise around furniture, refining gross motor skills; and the preschooler will play with crayons, honing fine motor skills. Nevertheless, generalities aside, environmental influences, occupational exposure and unusual aptitudes can result in occupational behaviours that are beyond the expectations of the age and stage of the individual.

Multiple determinicity

Multiple determinicity holds that many factors play a role in occupational development. Expanding on this principle of multiple determinicity, as initially proposed by Davis & Polatajko (2004), the IMOD is comprised of four key determinants of occupational development: person, occupation, environment and interaction.

Determinant: person

There are three person determinants for occupational development: genes/heredity, learning/plasticity and active participation/motivation. Many of an individual's innate abilities and their temperament are *genetically predetermined* (Saudino & Eaton, 1991). Scarr & McCartney (1983) suggested that genes influence an individual's development in two ways: through their expression as phenotypes and through their direct influence on individual environmental choice. Thus, an infant's genetic make-up may be expressed through certain occupational abilities and interests, and through temperament that influences occupational, developmental, environmental interactions.

Scientists have recently mapped the human genome and have begun to determine the role of over 30 000 genes in the unfolding of human life (International Humane Genome Sequencing Consortium, 2001). For example, the work on Williams syndrome, a rare genetic condition, demonstrates the variable influence of genetics on occupational development. While individuals with Williams syndrome cannot tie their shoes, write their name, or perform simple addition, they are avid readers and have extraordinary music abilities. These individuals demonstrate a great love of music, a wider range of emotional responses to music than typically noted, a higher incidence of perfect pitch and strong musical rhythm (Don et al., 1999; Lenhoff et al., 2001; Williams Syndrome Foundation, 2004).

Child prodigies also demonstrate exceptionally mature abilities in the performance of specific occupations at a young age (typically before the age of ten). Both innate mental and physical capacities, and temperament and personality factors, such as persistence, passion and commitment, influence their occupational development. Often seen as precocious, child prodigies are most commonly found to have superior abilities in music (such as playing the violin or piano, and singing), chess and visual arts (Feldman & Goldsmith, 1986). As Plomin (1994) pointed out, although genes influence development, they cannot do it alone. Without the influence of learning, active participation, an enabling environment and occupational exposure, an individual will not develop these skills.

Learning governs how genes are expressed through interaction with the environment, and regulates the course of development (Conger & Galambos, 1997).

It 'is the process by which behaviour or the potential for behaviour is modified as a result of experience' (Conger & Galambos, 1997, p. 31). The ability to learn is a function of *neural plasticity*, a term referring to the ability of the central nervous system to adapt structurally or functionally in response to environmental demands (Jacobs, 1999). The degree of change that the central nervous system can undergo is age dependent. Learning occurs more readily in early life when plasticity is greatest (Leakey & Lewin, 1992).

Individuals must learn how to do any occupations that they choose to perform in their life. Over the lifespan, as human abilities develop, they learn to feed themselves, protect themselves from the elements, navigate their environments, express their individuality and be creative. Children learn to bring together their developing capacities to reach a desired occupational outcome (Humphry, 2002). Cultural systems and social structures are created for the transfer of occupational information and possibilities from adults to children (Newman & Newman, 1997), to allow for development of occupational behaviours that *fit* with societal expectations. Thus, the developing capacities of the child, guided by adults, are brought together within the performance of new culturally relevant occupations (Humphry, 2002). This occupational performance leads to the development of further physical, cognitive and affective capacities, which are subsequently used by the child to perform current occupations with increased competence, as well as to develop new occupations (Edwards & Christiansen, 2005; Humphry, 2002). Since each child is born with different capacities, the development of competence in each occupation will be unique. The ease of learning signifies the 'fit' among the child's innate and developing capacities, the child's environments, and the occupations being learned. These occupations will form the basis for their occupational repertoire.

Individuals are *active participants* in their own development, shaping and directing their life course occupational repertoire from birth. Active children, with their innate and unique predispositions, affect the environments in which they interact, thus acting as an agent in their own development by selecting the pathways they wish to follow (Elder, 1998).

Since occupation is doing, it follows that occupational development demands *active participation* of the individual. Across the life span, individuals act on their environment and are active in other's environments (Rutter et al., 1997). In the absence of opportunity for active participation or human agency, occupational development is stunted or becomes abnormal. Unfortunately, there are many true life examples of this situation, such as the children in the Romanian orphanages. The effects of these depriving environments result in decreased ability of children to actively participate in constructing their life course occupational repertoire. Active participation remains essential throughout life, even in the later stages of life, where it has been shown that engagement in occupation can help maintain capacities and slow deterioration (Schaie, 1994).

An important factor in active participation is *motivation*. An individual's motivation toward initiating a behaviour, which refers to an individual's 'needs, goals and desires that provoke them to action' (Conger & Galambos, 1997, p. 35), also impacts development, by influencing acquisition of additional behaviours.

Without a motive or motivation to act, stagnation could occur in certain areas of individual development, affecting health and wellbeing. Active occupational participation is influenced by the individual's motivation to engage in that occupation, and leads to the development of occupational competence and the development of an occupational repertoire. The stronger the motivation an individual has for an occupation, the more likely it is that they will engage in the occupation and acquire the necessary competencies for the occupation to develop. From early on, very young children show motivation to engage in occupation, beyond simple imitation. Although it is difficult to know what is motivating the very young child to do, each appears to strive for an individual occupational outcome (Humphry, 2002). This desired outcome motivates them to learn to perform an activity by gaining an understanding of the intent of the occupation. Children often construct new ways of reaching their intended outcome, demonstrating their active participation in their occupational development.

Although it is commonly believed that children are primarily motivated to do *fun* things, studies have shown many other motivators for children's active occupational participation. In her analysis of historical literary works, Davis (2000) found 12 themes of motivating factors leading children to participate in occupations such as wanting to know everything about everything, trying to outdo one another, sense of accomplishment, pleasing and assisting one another and wanting to be a grown-up. Many of these themes were supported in a study by Wiseman et al. (2005), which examined the factors that influenced why children do (or stop doing) the occupations they do. They interviewed eight children and their parents and uncovered numerous motivating factors for the children: feels good, positive reinforcement, being good at *it*, curiosity, desire to teach or help others, feeling of responsibility and competition.

Determinant: occupation

Largely, what makes humans distinct from other species are the things we do. Historically, occupations were focused on immediate survival needs (Wilcock, 1998). However, as occupations evolved, their purposes expanded to encompass other human needs (for example creativity, socialization, relaxation and accumulation of material goods). New occupations are constantly being formed, due to technological advances and cultural and societal demands, expanding humankind's occupational possibilities.

Two factors which influence a child's uptake of occupational possibilities are *occupational exposure* and *occupational expectations*. As children grow, they are exposed to occupations by the people around them (see Figure 7.2). Children see what others do and this may provide them with the motivation to develop those occupations. This motivation occurs when there is a fit among the child's abilities, their environment and the occupation. In some instances, children appear to have an innate drive to do certain things regardless of exposure (Wiseman et al., 2005); however, for the most part, children are not likely to develop occupations unless they are exposed to them. Although children might be exposed to many different occupations, society's occupational expectations limit their ability to participate in

Figure 7.2 Grandfather and grandson playing road hockey.

all of them. Occupational expectations are constructed by a society or culture and pertain to who should be engaging in what occupations at what age, and which occupations are culturally and socially sanctioned. These three interrelated occupational determinants, (for example possibilities, exposure and expectations), play a central role in the development of the child's occupational repertoire.

Determinant: environment

Enabling and depriving environments have a considerable influence on the occupational development of individuals. These environments include: physical, social, cultural and historical aspects.

All humans live in *physical and social environmental contexts* and interact with these contexts through their participation in occupations across the lifespan. Individuals gain knowledge and develop their occupational competencies and repertoires within these environments. From birth, the size of the individual's world increases. When infants are born their physical and social environments are understood by what they can see, hear, taste, smell and touch, in their immediate vicinity. Although many environments influence their care, an infant's interaction with their environment is restricted to the immediate context. Toddlers begin to explore space with their newly developed mobility, developing new occupations, such as climbing and running. In middle childhood, as independence increases, children begin to use newly developed occupations, such as biking, to move into their neighbourhoods and communities, but still stay close to home. Once they enter

high school, children spend increasingly more time away from home, at increasingly greater distances. They begin participating with peers in clubs and after school sports and games.

The natural and built physical environments enable individuals to do what they need, want, or are expected to do. *Social environments* provide individuals with support, norms, education and resources that enable performance. Infants are born with limited capacity to survive; they are dependent on care-givers to enable their required occupations of eating, sleeping, dressing, bathing and playing. As young children learn, they no longer require the same level of physical support to engage in their occupations, although emotional support remains crucial. By middle childhood, the physical support required by children for occupational participation shifts to, for example, being driven to community events and lacing up ice skates. Emotional support remains a crucial aspect of the social environment throughout the lifespan, and deprived environments can have substantial influences on occupational development. Morison et al. (1995), studying children in an orphanage, found that a child's exposure to toys and attention from care-givers help to mediate the negative effects of the depriving environment. Once children are removed from deprived environments they are able to develop a certain level of occupation competence and establish an occupational repertoire (Rutter et al., 1998). This evidence suggests that the environment interacts with the maturational stage of the child in determining occupational development.

The physical and social environments in which humans live are constructed by their *historical and cultural contexts*. Pioneers such as Margaret Mead and Vygotsky have made us aware of the importance of society and culture on development (Damon, 1989; Harkness, 1992; Vygotsky, 1978). Two studies examining the influence of culture on children's occupational participation found that Mayan and Ugandan children's occupations were different from North American children's occupations (Bazyk et al., 2003; Gaskins, 1999; Sedgwick et al., 2003). Sedgwick and colleagues provide an example of the influences of cultural environments on occupational development in childhood. They found that children in Uganda performed different occupations from those children in North America, at different ages and in different ways. At very young ages, Ugandan children helped with chores around the home, including selling vegetables, sweeping, collecting water and caring for younger siblings. Children played with toys made from old containers and tyres that had been discarded. Bazyk and colleagues found that Mayan culture had very different values and expectations associated with play from those of North American culture, demonstrating how culture influences the development of these occupations.

Historical trends and circumstances shape culture and impact on the individual's development of values, beliefs, preferences, lifestyles and skills. 'Cultures define what is desirable to be learned, what is to be believed, and how to behave' (Scarr, 1993, p. 1335); in other words, cultures shape human occupation. The extent to which history influences human development was recognized by Bronfenbrenner (1994) when he added the chronosystem to his general ecological model, which 'encompasses change or consistency over time not only in the characteristics of the

person but also of the environment' (Bronfenbrenner, 1994, p. 1646). By examining children's occupations over a 340-year period using literary works, Davis et al. (2002) provided evidence that the dominant socio-cultural discourse of different historical periods influenced what children did.

Determinant: interaction

Considering interaction as a determinant brings into focus that the interaction of person, occupation and environment is, in itself, a determinant of development. The person and environment 'inter-penetrate one another in such a complex manner that any attempt to unravel them tends to destroy the natural unity of the whole and to create an artificial distinction between organism and environment' (Hall & Lindzey, 1970, p. 316). The person and environment come together through the performance of occupation. This determinant is considered so important in the occupational developmental process that it names the perspective, as a whole.

Discussing the interaction between person and environments, Scarr & McCartney (1983) hypothesized that 'people make their own environments' based on their genetic make-up. Scarr & Ricciuti (1991) proposed the notion of 'a good enough environment' (p. 19), which they feel is the *typical* environment available to most children in most cultures. It is proposed that the typical environments in which most children are raised contain many variables that provide the basics for 'normal' human development, and therefore, normal development takes place. According to Scarr & Ricciuti, the 'good enough environment' provides individuals with environments from which they can choose experiences that *match* their genetic make-up. However, they noted that this theory requires that the environment be varied and allow opportunities that match the individual's genotype.

Scarr & McCartney (1983) suggested that if the genotype and environment do not match, the effects of either could be greatly diminished. For example, a child prodigy who has innate talent for drawing will never fully develop occupational competence in drawing unless they are exposed to a rich and supportive artistic environment, including expert instruction, emotional support, strict personal discipline and a commitment to occupational competence development (Feldman & Goldsmith, 1986). This would suggest the need for a goodness of fit between the individual's genotype and the environment, and demonstrates the importance of individuals being exposed to and engaging in diverse occupations. Wiseman et al. (2005) found that occupational exposure was one of two initial steps in establishing occupations.

Without occupational exposure, many children and adults will never realize their innate talents unless the individual uncovers them on their own. This is akin to the concept of a 'just right challenge', where it is proposed that the environment and occupation must present the appropriate challenge to be engaging (Yerxa et al., 1989), to allow *flow*, or enjoyment (Csikszentmihalyi, 1975). Extrapolating this concept into the realm of development, it would seem likely that there needs to be a 'just right environment' that matches the individual's genotype, to allow for, and to support and enable the development of each individual's optimal occupational competence and life course occupational repertoire.

Multiple patternicity[3]

Multiple patternicity holds that an individual's occupational life course is marked by periods of both growth and decline, expansion and contraction, with occupations emerging at various points throughout the individual's life, involving different skills and developing at different rates. Two patterns mark the development of an occupational repertoire: multiple variations and changing mastery.

Multiple variations

The multiple variations pattern holds that growth and development is neither smooth nor unidirectional, involving both decline and growth. Different aspects of development show different patterns at different times. Adapted from the principles of *multidirectionality* and *trajectories and transitions* found in the literature on adult development and ageing, the principle of multiple variations describes the pattern of gains and losses, and the variations in rate, characteristics, quality, quantity, complexity and specialization involved in life course occupational development.

The occupational life course is seen as following a trajectory modified by various transitions. Trajectories are continuations of development, while transitions are periods of change or disruption in the trajectory. There are numerous potential times for transition in the course of a life. Some are related to the developmental milestones that mark the ages and stages of the domains that are foundational for occupational behaviours (for example cognitive, affective and physical). Others relate to life events, such as getting that first tricycle, starting kindergarten, going on a first trip away from home, graduating, getting a first job, having a baby, losing a loved one and retiring. Thus, it is difficult to characterize the pattern of occupational life course development, a priori.

Muir (1999) suggested four developmental patterns: *continuous*, gradually increasing with age (for example height, weight); *step*, increasing in a stop and start manner (for example mobility, cognition); *inverted U-shape*, first increasing, then reaching a plateau, and then decreasing (for example visual acuity, coordination); and *U-shaped*, first decreasing, then being absent, and then increasing. Using in-depth interviews to examine the occupations that children do, Wiseman et al. (2005) found that the pattern of occupational engagement varied widely among children. In some cases children as young as six years of age had abandoned occupations that other older children were still continuing. Also, some children had continued with such occupations as drawing and painting pictures since toddlerhood. Thus, none of the patterns described by Muir completely characterize the occupational life course. Hence, the occupational life course is described as having multiple variations.

Changing mastery

Changing mastery holds that an individual's proficiency in occupational performance changes over time. The concept of mastery refers to the change in levels of

[3] This section is taken from Davis & Polatajko, 2004 pp. 105–109, with modifications.

proficiency in skill performance, as a result of maturation and experience. People are thought to have a natural drive for mastery, which 'requires an individual to integrate his behaviour and develop skill in performing certain tasks' (Osipow, 1968, p. 92). Mastery is not static, rather proficiency changes across the lifespan, sometimes increasing, sometimes decreasing.

The development of mastery begins in infancy, when behaviours are very global in their intent. For example, infants use crying as a general form of communicating discomfort, hunger, tiredness or boredom. With time and experience and as the child gains control of primitive reflexes and develops voluntary movement patterns, these behaviours become more specialized and distinct in nature. The skills that are first developed in infancy, appear to be *virtually released* through interaction with the environment and are quickly and easily mastered (Bruner, 1973), while mastery of learned skills is dependent on the development of these *pre-wired* skills, and proceeds at a much slower rate. Increasingly, skills are performed to meet specific goals, showing greater intent. For example, as children develop language and other communication skills, their crying becomes more specialized in its form, intention and usefulness.

Along with the notion of specialization, behaviours also become more complex. The discrete features of children's behaviours increase in quantity, and become more refined and skilled, behaviour becomes more proficient. The increased quality is due, in part, to the increased integration of the cognitive, affective and physical components of occupational behaviour. As children develop, these components show greater interplay. This can be seen in children's increasing sophistication in toy use (for example banging blocks on a table top compared to constructing a fort of blocks). Each phase of development across the lifespan sees the emergence and disappearance of mastery of a variety of occupational skills. When an individual masters a skill they achieve control or power over a task or situation (Osipow, 1968).

At birth, babies are totally dependent on care-givers for basic necessities. Through interactions with their developing child, care-givers provide opportunities for learning and adaptation. In infancy, primitive reflexes are reorganized into simple voluntary movement patterns. Preschool children are focused on mastering foundational skills required for occupational competency in their elementary school years. Throughout adolescence, the number of occupations over which mastery is achieved increases, as does the quality and complexity of the occupations.

Macro-occupational development: the evolution of human occupations

Humans have always engaged in occupations. These have changed in concert with the evolving human and the evolving world. Consequently, there is a vast array of occupations that humans have engaged in at various points in history; some persist today, while many have changed. The development of these occupations across the course of human history is referred to as macro-occupational development. The

occupations of humans across evolution have been of considerable interest to scholars, particularly anthropologists, and there are countless descriptions of macro-occupational development available, albeit not under that rubric. Nonetheless, the study of the evolution of the human species has been tied to occupation, so much so that evolutionary eras have been named in terms of the key occupations of the time such as hunters/gatherers, agrarians. Thus, there is a wealth of information available on the development of occupation at the species level.

An interest in the macro-level of occupational development emerged with the advent of occupational science. One of the key proponents of understanding human occupation across time was Wilcock (1998), who published a comprehensive study of human history from an occupational perspective. Wilcock described occupational changes that occurred at each evolutionary age (see Table 7.2). She showed that human biological and occupational evolution have a reciprocal relationship, which is influenced by environmental context. The evolution of

Table 7.2 The evolution of human occupations.

Evolutionary age	Human occupations
Hunters/gatherers	• Humans hunt, gather and scavenge for food. — simple stone tools developed to help with survival — sharing or social interaction does not occur • As groups get larger food sharing develops and occupations are divided among group members.
Agriculture	• Shift from hunting/gathering to farming occupations. • Farmers begin to plant own food, remain in one place with larger groups of people. • Both women's and men's occupations change to accommodate farming. • Possible reasons for this shift: — climatic changes that produced physical environments conducive to agriculture — increases in population requiring different means of sustainability — development of occupational capacity or competence, which led to increases in skills, development of new occupations
Industrialization town and city workers	• Producing goods for others' consumption. • Occupations are still about survival needs. However, many individuals receive remuneration for their work and services. • Paid work is valued. • More social occupations emerge as groups became larger. • Occupational specialization occurs, whereby the individual does small parts of a larger occupation, repetitively.
Post-industrialization	• Work becomes primarily something you do so that you can earn money to buy food and material things. • Occupations change from those of production to service. • Technological development begins to drive occupational development instead of human nature and needs.

Based on information found in Wilcock (1998).

human occupation has matched the evolution of human biological capacities and they, in turn, have provided humans with the capability to create further occupational possibilities and construct the necessary tools and materials to enact those occupations.

Davis et al. (2002) added to this literature with their study of literary works written between 1650 and 1990. They found evidence of both change and continuation. Over this 340-year period some childhood occupations, such as coal collecting, essentially disappeared. New occupations emerged, such as playing computer games and some remained throughout, such as playing with balls or dolls. Most significantly, the change in occupations over time was influenced by dominant socio-cultural beliefs and values. Similarly, Bing (2005), describing the evolution of occupations as they relate to historical beliefs, argued that numerous variables contribute to macro-level occupational development. He stated that historical beliefs alone have not determined occupational behaviour; technological advances have also altered the amount of time spent in work and leisure occupations.

Implications for practice

Staged continuity implies that children have a continuous, innate tendency towards doing or being occupied. Specific occupations will change across the lifespan, in concert with their age and stage of development. However, other factors, namely previous occupations, may also influence a child's occupational repertoire. The occupational behaviour of a child who is not occupied or not occupied with occupations that are consistent with their age or developmental stage may indicate a problem. However, the principle of multiple determinicity, would suggest that more than the developmental status of the child needs to be investigated.

The principles of multiple determinicity and patternicity show that the occupational behaviour of an individual cannot be predicted from age and stage alone. Thus, a child's occupational repertoire cannot be inferred from knowledge of the child's age and stage of development alone. Nor can it be inferred that a child beyond a particular age will no longer acquire occupations that are typical of that age or stage. To carry out a comprehensive evaluation of the occupational developmental status of a child, the therapist goes beyond assessing the child's developmental level in the components of occupational behaviour (for example cognitive, affective and physical). The therapist also determines the particular occupations the child can do, did in the past, does now, and wants to, needs to or is expected to do, using such tools as the Canadian Occupational Performance Measure (Law et al., 1998). The therapist also determines the child's occupational opportunities and the barriers and supports present in the child's environment. Based on stage theory, when a therapist finds that a child has an occupational competence that is incongruent with their developmental status, the therapist may consider that the child has developed a splinter skill. If working from a sensory integrative therapy framework, the child may be taken back to earlier stages of development in therapy (Ayres, 1972). Within the context of multiple determinicity and patternicity,

splinter skills are better understood as evidence of the influence of interactionism on occupational development. Thus, when attempting to promote a child's occupational development a therapist using these principles would consider a number of strategies that could be used to improve a child's occupational competence, including performance based treatments, such as, the cognitive orientation to daily occupational performance approach (Polatajko & Mandich, 2004), or environmental adaptations or modifications (Letts et al., 2003).

Summary

Paediatric occupational therapists are keenly interested in human development, not for its own sake but for its role in supporting mastery of occupations across the life course. Occupational development is defined as the systematic process of change in occupational behaviours across time, at the level of the occupation, the individual and the species. Occupational development is not only influenced by the developmental status of the person, but also by the occupations and environments with which they interact. The Interactional Model of Occupational Development (IMOD) describes the nature of this interaction. It is based on the premise that interactionism is a key mechanism of occupational development, underlying both individual development and occupational behaviour. The principles that govern occupational development are staged continuity, multiple determinicity and multiple patternicity. Each of these helps to explain and predict the course of occupational development and has implications for practice.

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