

Chapter 6: An overview of Montessori pedagogy - recontextualising and decontextualising educational knowledge

6.1 Introduction

The previous chapters proposed a meta-analytic framework which resonates with the theoretical tradition from which Montessori pedagogy emerged. The framework is a combination of three complementary theoretical approaches to the analysis of the Montessori objects and the pedagogy within which they are located: Vygotsky's account of the evolution of a child's consciousness from practical action, fused with sign use, to internalised thought, Halliday's multi-dimensional social semiotics and Bernstein's pedagogic device.

The three approaches will be used in this chapter to explore Montessori pedagogy. First, they will be used to review the chronology of a child's developmental stages, and the relation of this chronology to pedagogic discourse. Second, they will be used to review a selection of Montessori ensembles designed for different stages of development. This review will consider how educational knowledge is recontextualised in the instructional discourse in which the Montessori objects are embedded, how social interaction which regulates the use of the objects is transformed into internally-regulated thinking, and how activity in which the objects play a part is decontextualised into recontextualisable abstract meaning-making.

Only small areas of Montessori pedagogy are sampled in this chapter. The samples selected, however, are loosely unified through the common theme of geometry. Geometry is one of the four mathematics-based subjects of the Quadrivium taught in European universities in the medieval period. Geometry figures prominently in Montessori pedagogy for children aged from three to twelve years because of its abstractness. In the Montessori curriculum mathematics is considered from 'three points of view'; from the point of view of arithmetic ('the science of number'), algebra (number in the abstract) and geometry ('the abstract of the abstract') (Montessori 1946, p. 8)¹. In other Montessori curriculum areas geometric representation is a marker of the most abstract educational

¹ Similarly, Vygotsky (1986 [1934], p. 202) writes that numbers abstract and generalise 'certain aspects of objects' and algebraic concepts represent 'abstractions and generalisations of certain aspects of numbers'.

knowledge, for example, geometric shapes are used to symbolise grammatical categories (See Chapter 7 below). Turning our attention to geometry also recalls its use in the era of both Locke and Condillac to exemplify abstract, logical thought, the type of thinking Vygotsky identified as a quintessential aspect of higher mental functioning.

6.2 The four planes of development

6.2.1 The constructive rhythm of life

In 1938 Montessori gave a lecture on the ‘four planes of education’.² By 1950 she had expanded the account to encompass ‘the whole continuum of development’ in ‘all its aspects (physical, intellectual, emotional etc)’ (Grazzini 1996, p. 209n2; see Illustration 6.1). Montessori represented the stages of development as a ‘rhythm’ of six year cycles, each cycle having an opening and closing phase. The first phase of each cycle ‘opens up to a set of particular experiences and consequently to the related acquisitions and conquests’, and the second half consolidates these achievements in preparation for the next cycle (Grazzini 1996, p. 212).

² The lecture entitled ‘The Four Planes of Education’ was delivered by Montessori at the Seventh International Montessori Congress in Edinburgh, in 1938, the last congress before the outbreak of World War II. The lecture was later edited by Mario Montessori and published in the Association Montessori Internationale (AMI) journal, *Communications* (1971, No. 4).

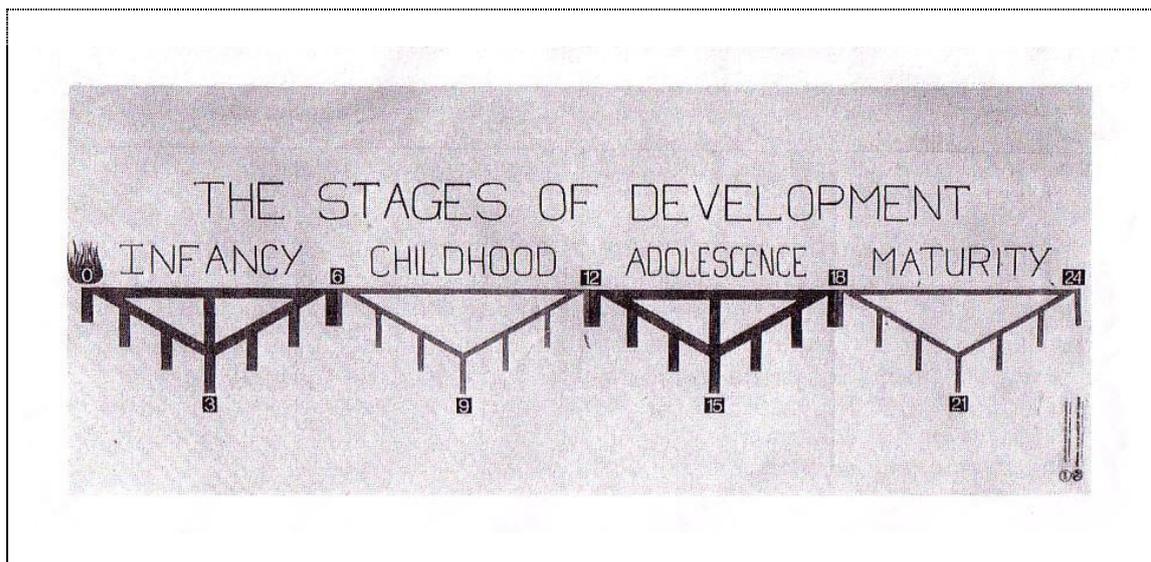


Illustration 6.1: The Stages of Development (reproduced in Grazzini, 1979, p. 30)

A Montessori classroom, and the instructional approach used in the classroom, are designed to provide motives for activity matched to the changing needs (physical, emotional, social and intellectual) of children in each developmental plane. In terms of Bernstein's pedagogic device, the Montessori stages of development bring into relation the child's age and developmental stage with the content of the curriculum and the social relations between student and teacher. They can also be linked with the zone of proximal development proposed by Vygotsky.

6.2.2 Sensitive periods and the rhythm of development

The rhythm of development is guided by the sensitive periods of each plane, as described by Grazzini (1996, p. 212) in the following way:

The sensitivities pertinent to a particular phase appear, increase, reach a maximum, and then decline; new sensitivities appear, reach a maximum, and decline to give way to yet other, new sensitivities; and so on. It is these sensitivities, then, that guide development and determine its rhythm.³

As introduced above, Montessori's description of sensitive periods as temporary sensitivities and periods of heightened, playful interest influenced Vygotsky's conception of the zone of proximal development. In this zone functions just beginning to mature and develop respond positively to collaborative instruction. Instruction in this zone is oriented to the child's future potential, rather than to the child's existing functions. This effect is achieved in Montessori pedagogy through the alignment of sensitive periods to each plane of development.

The four planes of development identified by Montessori are infancy (birth to six years), childhood (six to twelve years), adolescence (twelve to eighteen years) and maturity (eighteen to twenty-four years). Infancy and adolescence are described as more turbulent 'creative periods', in contrast to childhood and maturity, which are 'calm phases of uniform growth' (Grazzini 1996, p. 213). The following sections summarise the way Montessorians describe each plane of development.

³ According to Montessori tradition, when a sensitive period is active, and if the environment provides the motive, the child constructs the corresponding aspect of the self effortlessly and perfectly, whether that aspect is physical, intellectual, emotional or cultural. If the environment does not provide the child with a relevant motive for development while the period is active, the intense creative energy is dissipated and the opportunity is lost. Initially Montessori (1962 [1909], p. 358) used the term 'need of development':

It is necessary to offer those exercises which correspond to the need of development felt by an organism, and if the child's age has carried him past a certain need, it is never possible to obtain, in its fullness, a development which missed its proper moment.

The later term 'sensitive period' is attributed to the geneticist Hugo de Vries, and is compared with the notion of 'budding points' used by botanists. See, for example, Montessori, 1949, pp 40-51. More recently Deacon (1997 p. 126) has described the phenomenon as the 'critical period effect' of immaturity.

6.2.3 The plane of infancy

At birth the child has ‘potentialities’ and tendencies (Montessori 1949, cited in Grazzini 1996, p. 214), but no pre-established movement or intellect.⁴ The opening phase of infancy, from birth to about three years, is the period of the psychic, or spiritual, embryo, a period during which the psychological functions, or organs, related to movement and intellect are formed in a manner analogous to, although qualitatively different from, the formation of physical organs in the prenatal period, each function developing separately, before merging into the whole (Montessori 1982 [1949]). The sensitive periods of the plane of infancy enable the development of movement, language and sensory discrimination, and the child’s achievement of physical independence. The Montessori program designed for the opening phase of infancy includes Assistants to Infancy, in which parents are assisted to prepare for the arrival of a new baby, and *Il Nido* (the nest), the environment prepared for toddlers.⁵

In the closing phase of infancy, from about the age of three to six, the ‘unconscious creator’ of the opening phase transforms into a ‘conscious worker’. The child develops the functions created in the earlier phase by consciously using the environment as ‘the means for his development’ (Montessori 1949, cited in Grazzini 1996, p. 215). Consciousness is developed through activity, ‘guided by the mind’ (ibid), activity which is traditionally

⁴ In the Montessori tradition the human potential manifested in sensitive periods is presented as an inventory of innate tendencies. Each tendency manifests itself differently during each developmental plane (Mario Montessori 1956, published as a revised edition by AMI nd). These can be usefully compared with the neonate’s ‘innate predisposition to attend to other persons’ and ‘innate motivation to come to know the world around them’ identified by Painter (1996, p. 50).

The list of human tendencies, combined with a chart of human needs (ie physical needs such as food, shelter, clothing, transport, defence and ‘spiritual’ needs such as aesthetics, religion, adornment) are recycled as frameworks in the Montessori History curriculum for six to twelve year olds. The children use this framework to explore and compare how different cultures over time have realised human potential.

⁵ The program, in Italian *Assistenti Infanzia Montessoriane*, is mentioned in a footnote only (Montessori 1982 [1949], p. 108). The toddlers environment in this program, the *Nido*, is perhaps derived from the following passage:

... the fledging in the nest does not prepare for flight by flying, but remains motionless in the little warm shell where its food is provided. The preparations for life are indirect. ... the preparation in the secret places of a nest or a den, or in the motionless intimacy of the cocoon. ... The childish spirit should also find a warm nest where its nutrition is secure, and after this we should await the revelations of its development (Montessori 1965a [1916/1918], p. 139).

According to Wilson (1987, p. 241) the ideas on which the 0-3 year environment is based emerged during Montessori’s years in India.

called ‘play’, but which in the Montessori tradition is called the child’s developmental ‘work’ (Cossentino 2006).⁶

The aim of Montessori pedagogy for a child in the second phase of infancy is to provide ‘motives for constructive activity’ in the child’s environment. The embryo of this period is a social one, the child’s ability to form a community with other infants, and the classroom becomes a ‘society in embryo’ (Grazzini 1996, pp. 216-217). The Montessori environment designed for the second phase of infancy is the *Casa dei Bambini*, or the *Children’s House*, the most well-known and iconic of the Montessori environments.⁷ The focus of pedagogy in the Casa is ‘that part of the child’s world that comes in contact with the external world [comprising] the senses, movements, and the outward manifestations of his choice ... accomplished by the manipulation of objects’ (Standing 1962 [1957], p. 236).

6.2.4 The plane of childhood

The plane of childhood, from six to twelve years, is the period in which ‘the abstract plane of the human mind is organized’ (Montessori 1948, cited in Grazzini 1996, p. 216). The sensitive periods of this plane relate to intellectual and ethical development. It is comparatively stable period in which the child’s field of activity expands physically and mentally and ‘there is no limit to what this child can explore, if the opportunities are there and the conditions are favorable’. The child of this period is ‘hungry for culture, ... for knowledge and understanding of the world built by Nature and ... by mankind’. This child is ‘endowed with ... the power of imagination, the power of abstract thought and reasoning, physical strength and health’ (Grazzini 1996, pp. 216-217). The Montessori pedagogy for this plane, known as *Cosmic Education*, introduces the child to discipline-based educational knowledge with an evolutionary and ecological orientation. During this period the child is also given the opportunity to explore ethical questions and to build a community of peers based on ‘rules to be governed by and work to be done’ (Grazzini

⁶ Recently Cossentino (2006, p. 63) has argued that ‘Montessori’s conception of work substantially revises prevailing assumptions about the nature of childhood, the roles of teachers, and the purpose of schooling’.

⁷ The term ‘casa dei bambini’ was already being used by the two Agassi sisters for the preschool classroom they operated in Brescia, northeast of Milan, at the time Montessori opened her first classroom in Rome in 1906. These sisters are acknowledged occasionally in the Italian literature but never in the English-speaking literature, as pointed out by Wilson (1987).

1996, p. 217). The child in this plane is working towards intellectual and ethical independence.

The contrast between the sensory orientation to the immediate surroundings of the first plane and the abstract orientation to the cultural universe of the second is summarised by Grazzini (1996, p. 217) in the following way:

While the infant incarnated and thereby became adapted to the reality immediately surrounding him (an audible, visible, tangible reality), [the] child [from six to twelve years] can explore, internalize, and thereby become adapted to a reality as large as the world, the universe, the whole of humanity, all of culture (a reality which is not necessarily either visible or tangible because of time or distance or other factors).

The Montessori objects analysed in this chapter and the next are designed for children in the second phase of the first plane of development (from three to six years) and the first phase of the second plane (from six to nine years).⁸

6.2.5 Beyond childhood

The first two planes are followed by a second creative plane, adolescence, and a second plane of steady development, the period of maturity.

During adolescence the adult is created, and prepares for a role in society. Montessori (1973a [1948]) outlines a learning environment for the first three years of secondary education. The design of this environment is based on communal life in the country, with the aim of consolidating the intellectual achievements of the previous plane through a tutorial system and addressing adolescent sensitive periods relating to economic independence and the building of self-confidence, dignity and a sense of justice (Kahn 1997, 2005). By the age of fifteen a child is considered in the Montessori tradition to be ready to meet the demands of mainstream study and work.

The sensitive period of the plane of maturity, associated with tertiary education, relates to social responsibility, moral independence and training to do work that contributes to the common good of humanity. Thus, the culmination, the final cause, of the Montessori developmental pathway is a humanistic one, in which children are enabled to achieve their

⁸ See also Montessori (1977 [1937]).

full potential, whatever that may be, in the service of a higher social good (See, for example, Montessori 1974 [1946]).

Montessori's rhythmic model of development is based on the metaphor of transformation, or metamorphosis. In other words, development in the Montessori tradition is:

... a sequence of births, of the emergence and disappearance of potentialities, of the birth and death of those interests and characteristics which are a manifestation of the ruling sensitivities (Grazzini 1996, p. 219).

The progress of development in this tradition is drawn towards potential, or 'finality', in contrast to the 'causality' of contrasting linear developmental models based in the metaphor of accumulation. When introducing the Montessori doctrine of finality in Section 4.2, I proposed recasting it in semiotic terms. This step makes it possible to compare Montessori's model of development with approaches in which the development of cognition is equated with the development of semiotic potential, specifically the models of development proposed by Vygotsky and Halliday. Montessori, Vygotsky and Halliday all observed and recorded in detail the activity of developing children. Given this shared empirical starting point, it is not surprising that their approaches have much in common, while, at the same time, the diversity of their temporal and cultural contexts results in interesting differences. Selected complementary perspectives, relevant to this study, are introduced in the following section.

6.3 Complementary approaches to developmental transitions

6.3.1 Periodic transformation

In accord with Montessori, Vygotsky (1978, p. 73) rejects the view of development as 'the gradual accumulation of separate changes'. Instead he conceives of development in genetic terms as:

... a complex dialectical process characterized by periodicity, unevenness in the development of different functions, metamorphosis or qualitative transformation of one form into another, intertwining of external and internal factors, and adaptive processes ...

More specifically, Vygotsky (1986 [1934], p. 155) rejects Piaget's view of development as the gradual displacement of the child's mentality with the adult's, emerging from 'a

ceaseless conflict' between two different kinds of thinking. Instead, the process is modelled as collaboration between child and adult, a collaboration in which developmental steps build on what came before and the child's psychological functions evolve into higher forms.

The transitions Vygotsky (2004c) identifies, what he calls the 'critical age levels', echo those identified by Montessori. He describes a series of transitional crises, at the ages of three (infancy), seven (childhood) and thirteen (adolescence). Vygotsky (2004c, p. 496) describes these transitions as 'biosocial', in other words, as the child matures biologically, the child's relation with the external social environment changes. Consciousness is a function of this relation. With each transition the child develops 'new incentives and new motives' and a 're-evaluation of values' (Vygotsky 2004c, p. 499).

According to Vygotsky (1986 [1934], pp. 168-171), the period from three to nine years builds on the infant's achievements in perception and practical action and expands, in the preschool years, into the development of memory. Subsequently, school instruction further generalises the child's perception 'through the portal of scientific concepts'. Educational knowledge systematises concepts for children and in this way brings them under 'conscious and deliberate control'. The bringing of educational concepts under conscious control follows, predictably in the Vygotskian framework, a genetic pathway centred on the development of 'word meanings'. This pathway is a microgenetic example of the ontogenetic role of ideal forms in the environment. It is of particular relevance to Montessori pedagogic discourse, as introduced in the previous chapter in the context of the folding cloths exercise. The following brief account of the pathway is based on Vygotsky (1986 [1934] p. 118-141).

Concept development originates when the infant begins to associate elements of experience into 'complexes' linked on the basis of sensory perception and practical action in the immediate context (p. 118). By the preschool period, the 'word meanings' used by the child to generalise this experience coincide with the 'word meanings' used by adults. This makes it possible for the young child and the adult to interact with each other and to understand each other (p. 121). The child's generalisations, however, are just at the beginning of their genetic path and are still tied to practical experience. At this point, to use Vygotsky's term, they are 'pseudoconcepts' (p. 119). Pseudoconcepts evolve into 'potential concepts' when the child groups objects by generalising on the basis of similar

empirical attributes or functions. Adult use of shared ‘word meanings’ predetermines the path the child’s generalisations will take as they evolve into fully-formed abstract concepts, which typically emerge in adolescence. Vygotsky variously calls a pseudoconcept a bridge to the future adult meaning (p. 118), and a shadow, or contour, of the future adult meaning (p. 122).

The period in which ‘word meanings’ evolve from generalisations based on practical action to fully abstract concepts coincide with the preschool and school years. School instruction, incorporating the conscious development of written language and the mastery of educational knowledge, such as arithmetic and grammar, Vygotsky (1986 [1934], p. 186) argues, is critical in the development of higher abstract functioning in general. During the school years Vygotsky (1978; 1986 [1934]) emphasises the significance of play and imagination, systematic instruction and decontextualisation of external mediational means, notions which will be elaborated in the context of analysing Montessori ensembles in this and the following chapter.

6.3.2 Expanding meaning potential

In harmony with Vygotsky, Halliday (1978, p. 29) describes children’s language development as a process of learning to free language ‘from the constraints of the immediate environment’, and to develop ‘the ability to use language in abstract and indirect contexts of situation ...’, a process which begins very early, develops gradually and becomes critical to the child’s ability to use language as a means for learning at school.

Human development is modelled by Halliday (1975, 1993b, 1995, 2004b) as semiotic development, a process in which language and consciousness co-develop.⁹ More specifically, Halliday (2004b, p. 24) portrays the process as one of transformation between the ‘material and semiotic’ realms of human experience, a process which is ‘closely integrated with the physical development of the body’ and ‘the mediating effects of the child’s progressive visual mastering of his environment’. The period from birth to two and a half years, the unconscious creative phase of infancy in Montessori terms, is described

⁹ The developmental progression described in Halliday’s study is verified in subsequent studies by, for example, Painter (1984) and Phillips (1985).

by Halliday (1975) in particular detail. This period is divided into three stages by Halliday (2004b): the prelinguistic period from birth to about nine months, the protolanguage from nine months and, with the emergence of grammar, the transition into language proper from about eighteen months.

Halliday aligns the transitions which expand the child's semiotic horizons with the transitions which expand the child's range of movement, and, consequently, field of attention. For example, exchanges of attention between newborn and mother expand into movements and meanings directed at people and objects in a widening sphere of attention. The function of **indication** emerges as directed grasping and pointing during this time, the origin, in Vygotsky's terms, of the genetic trajectory which leads to generalisation and the symbolic function of speech. As the child begins to roll over and then sit up, systematic acts of symbolic meaning develop into the first signs (context-expression pairs). These first signs are iconic, the relation between content and expression being a natural one (Halliday 1993b, p. 95). During the crawling stage the child creates a personal system of simple signs, the protolanguage, in which sets of signs contrast with each other to bring meaning relations into existence and sign use instantiates a system of meanings clustered according to discrete context-dependent microfunctions (See also 5.5.4).

When the child begins to walk, the field of attention expands indefinitely. At the same time grammar, an abstract layer of semiosis, begins to intrude between content and expression in the child's meaning system, and the protolanguage begins the transformation into language proper. At this point the child is propelled 'from primary consciousness to a consciousness of a higher order' (Halliday 2004b, p. 25); the metafunctional framework of language, and of higher order consciousness, has begun to take shape. At this stage the framework is transitional, comprising two sets of interdependent meaning systems, meanings reflecting experience in the world and meanings enacting social relationships.

With the emergence of the transitional functional framework at about eighteen months, indication evolves into labelling and naming, a developmental move given significance by Vygotsky (Section 4.3.4) and accounted for semantically through an analysis of textual meaning (Section 5.6.3). These early steps towards generalisation comprise the evolution of proper names for single entities into common names for categories, or classes, of things (nouns), processes (verbs) and properties (adjectives) (Halliday 1993b, pp. 98-99). With the resulting expansion of lexicogrammar, the emerging language system now has the

potential ‘for creating information’ on the basis of the principle of taxonomy (Halliday 1993b, p. 99).

The final step into language proper is achieved when the child freely combines interpersonal meaning systems, those enacting social relationships (doing), and experiential meaning systems, those reflecting experience (understanding), in order to exchange (offer and ask for) information (Halliday 2004b, p. 34). Unlike the exchange of goods and services, which is achievable using material resources, exchanging information is a wholly semiotic process, and depends on both the metafunctional framework and the layer of lexicogrammar. At this point the child has the potential to generalise, to isolate and combine independent variables of the system, to link meanings logically and to structure texts. From now on, learning becomes a process of expanding this potential.

Halliday’s grammar-based study of a child learning how to mean dovetails with much which appears on developmental timelines prepared by Montessori (1982 [1949]; colour plates facing pp. 106, 120 and 136). These timelines represent for trainee Montessori teachers the development of language and movement in children from birth to the age of two and a half years. In accord with her approach to pedagogy in general, Montessori prepared multiple representations of these timelines, one with captions describing the developing language, one mapping the child’s developing movement onto the child’s developing language, and one which represents language development as grammatical development, using the geometric shapes Montessori designed to represent grammatical categories. Milestones identified on these timelines which foreshadow Halliday’s data are summarised in Table 6.1 below.¹⁰

¹⁰ Montessori (1967 [1948], p. 258) cites Stern as the first to observe and record the ‘grammatical’ order of early language development, but she gives no reference. In *The Absorbent Mind* (1949) the translator cites Stern, W. 1939 (In German 1914) *Psychology of Early Childhood up to the 6th Year of Age*. 2nd edition. See also the critique of Stern’s conception of language development by Vygotsky 1986 (1934), pp. 58-67.

Age	Montessori's timelines		Halliday's data
	Movement	Language	
<i>From birth</i>	<ul style="list-style-type: none"> turns towards sound and looks at mouth that speaks grasping (instinctive → intentional)¹¹ lifts head → sits up 	<ul style="list-style-type: none"> first syllables babbling 	<p><i>Before the protolanguage</i></p> <ul style="list-style-type: none"> shared attention; exchanges of attention rolling over → sitting up movement and meaning are indistinguishable and increasingly directed iconic signs (based on grasping)
<i>From 9 months</i>	<ul style="list-style-type: none"> purposeful grasping (choice) walks on four limbs → walks with help 	<ul style="list-style-type: none"> conscious that language has meaning first intentional word understands meanings expressed in language 	<p><i>Protolanguage</i></p> <ul style="list-style-type: none"> crawling personal sign system (incorporating instantiation and systemic contrast) enabling exchanges of meaning with caregivers discrete microfunctional contexts
<i>About 18 months</i>	<ul style="list-style-type: none"> walks without help repetition (preparing for work) maximum effort to coordinate hand and body movement and to build strength and equilibrium (carrying, climbing, lifting) 	<ul style="list-style-type: none"> 'Everything has a name.' words with diffused meaning; clauses with few words an explosion of words 	<p><i>Transition</i></p> <ul style="list-style-type: none"> walking emergent functional framework emergent grammar (labelling, naming, generalising)
<i>About 2 years</i>	<ul style="list-style-type: none"> purposeful movement (work) 	<ul style="list-style-type: none"> all word classes appear 'Language is now complete.' an explosion of clauses¹² 	<p><i>Language</i></p> <ul style="list-style-type: none"> metafunctional framework tri-stratal realisation (meaning, lexicogrammar, expression) exchanges information
<i>Beyond 2 years</i>	<ul style="list-style-type: none"> runs, climbs and hold things with certainty takes long walks work leading to independence 'Help me do it by myself.' 	<ul style="list-style-type: none"> joins words to express thoughts expresses thoughts about the future 	<p><i>Expanding meaning potential</i></p> <p>uses lexicogrammar to extend semiotic space multidimensionally (delicacy, new semantic domains, recombining variables)</p>

Table 6.1: A comparison of Montessori's and Halliday's developmental models

¹¹ The → symbol is used in this table as a space-saving device to indicate the evolution of one function into another.

¹² The original Italian term is 'frase', which translates into English as 'sentence' or 'clause'. In the English translation (Montessori 1982 [1949], p. 106) the term 'frase' has been inadequately translated as 'phrase', as in 'coordinated and subordinated phrases'.

The commonalities which emerge between these two models of development reinforce the relevance of Halliday's linguistics to generalising Montessori's pedagogic proposals. Significantly, both models address what Halliday (2004b, p. 17) terms 'the constant interpenetration' between 'the material and the semiotic', as well as the parallel expansion of a child's control over the material and the semiotic environments. The metalanguage of systemic theory used by Halliday to explain his data, however, adds an explanatory power which, to date, the Montessori literature has lacked.

Beginning with the infant's move into language proper, Halliday (1993b, p. 111) proposes a three-step model of human semiotic development. The first step is *grammatical generalisation*, which is 'the key for entering into language' for the infant, as described above¹³. The second step is *grammatical abstractness*, 'the key for entering into literacy, and to primary educational knowledge'. Learning educational knowledge involves learning through two complementary grammatical modes: 'the dynamic mode of everyday commonsense grammar and the synoptic mode of the elaborated written grammar' (Halliday 1993b, p. 111). Mastering this step is the task of the preschooler and the child in the first years of school between the ages of three and nine, the period which is the focus of the analyses below. The third step is *grammatical metaphor*, the key to secondary education and 'knowledge that is discipline-based and technical', a step which becomes critical from around the age of nine.¹⁴

It is through language, argues Halliday (1993b, p. 94; emphasis in original), that 'experience **becomes** knowledge'. From this perspective language and learning are inextricably intertwined. Halliday suggests that the learning strategies used by infants in informal settings, first, to learn language, and then to expand the potential of their language once they have learned it, can be extrapolated for use in the design of pedagogy for formal educational settings. Strategies which can be extrapolated from the infant's first steps into language include linking meaning to movement, the use of iconic signs, working on small manageable meaning systems in isolation before later incorporating them back into the language system as a whole and the use of principles of generalisation

¹³ A detailed exploration of this step is found in Painter's (1999a) social semiotic study of one child's language development from two and a half to five years, a study which reveals how the language learning strategies of the infant are redeployed and elaborated by the preschooler. A feature of the child's development was the 'move into generalization in the fourth year; that is, the use of language to construe meanings which have relevance beyond the immediate context of situation' (p. 327).

¹⁴ Halliday's three step model of human semiotic development is elaborated in Painter, Derewianka and Torr (2005).

and taxonomy. Once lexicogrammar has opened up for the child an elastic ‘multidimensional semantic space’ (Halliday 1993b, p. 101) further strategies emerge. These include refining existing meanings by introducing more delicate distinctions, extending meaning potential into new semantic domains, both experiential and interpersonal and recombining variables in new ways.

Halliday (1993b) also draws attention to a set of global strategies used by children as they learn. These include the strategy of previewing a developmental step, that is, leaving a *footprint*, then retreating before returning to consolidate and build on the step later (p. 97), a strategy which accords with the Montessori instructional strategy of indirect preparation.¹⁵ A further strategy identified by Halliday is the *magic gateway*. A magic gateway opens up when a child finds a special way into a new area of meaning. In informal contexts this is often an interpersonal gateway (p. 98; see also Painter 2004). It will be argued below that the Montessori objects can be interpreted as designed ‘magic gateways’ into educational knowledge, gateways based on practical action, and a two-way (external↔internal) orientation. Halliday also identifies *filtering* as a strategy; in other words, children filter what is in the environment in order to allow in what is within their grasp at the moment and to exclude what is not (p. 105), a strategy which resonates with Montessori’s sensitive periods and Vygotsky’s zone of proximal development.

6.3.3 Providing a semiotic preparation for learning educational knowledge

Halliday’s study of language learning in infancy has been extended in a study of a preschool child’s language and learning by Painter (1996, 1999a, 1999b). Painter’s study follows the genesis of an English-speaking middle class child’s language development in the everyday context of the home and family from the age of two and a half to five. A feature of the child’s development was the ‘move into generalization in the fourth year; that is, the use of language to construe meanings which have relevance beyond the immediate context of situation’ (Painter 1999a, p. 327). In other words, Painter analyses, at the level of lexicogrammar, the genesis of generalisation and abstraction, identified by

¹⁵ In support of the principle of indirect preparation Montessori (1982 [1949], p. 149) argues:

Nature herself works on this principle. Even in the embryo, she builds organs in anticipation of the need which the individual will have for them, and only when the machinery exists does she call it into action.

Vygotsky as the decontextualisation of mediational means (Sections 4.4.5; 6.3.1) and by Halliday as the steps in human semiotic development which lead to literacy and school learning (Sections 5.5; 6.3.2).

Specifically, Painter's study draws attention to developments in the preschool child's everyday language which provide a 'semiotic preparation' for learning educational knowledge at school (Painter 1996, p. 332). Some features of semiotic preparation revealed in Painter's lexicogrammatical analysis can be extrapolated to the multimodal analysis of objects and language in Montessori ensembles. These include the use of 'semantic overlap' or redundant *multiple representations* of the 'same semantic domain'; *grammatical metaphor*, or 'two distinct meanings represented by a single lexicogrammatical structure'; *metasemiosis*, or the use of a metalanguage; and engaging in *comparison and contrast*, because semiotic systems are 'paradigmatic resources'. It also includes 'the ability to interpret an inanimate object as a symbolizer', the ability to represent, and reflect on, 'the ideas of oneself and others', and the ability to use definitions (Painter 1999a, pp. 319-322).

In summary, the child's semiotic development, as analysed by Painter (1999a, pp. 328-331), has four aspects. First, language is distanced from its immediate context, for example, in the shift from classifying observable phenomena to taxonomising phenomena in categories in an expansion of ideational meaning. Second, as language becomes an object of attention, semiosis is brought to consciousness. Third, abstract and metaphorical meanings emerge, for example, through definitions and the expansion of the resources of the textual metafunction. Finally, meaning comes to be represented monologically as a means of building contexts of meaning-making, and knowledge, independent of the immediate material context. The analysis below will explore how these aspects of semiotic development are incorporated into Montessori ensembles.

While the direction of the developmental trajectory analysed by Painter points towards monologue and decontextualised written language, its source remains shared attention directed towards observable phenomena in the context of interpersonal interaction, because 'as soon as linguistic symbols become the medium of learning, then learning has to be understood as an inherently interactive, interpersonal process' (Painter 1996, pp. 51-52). In terms which echo the understanding of the Montessori objects which underpins this study, Painter continues:

This is not to deny the material, but to argue that material reality can only be known – can only be an object of learning – by being construed as systems of meaning.

6.3.4 A multi-dimensional instructional landscape

A meta-analytic framework which resonates with the Montessori tradition was established in Chapters 4 and 5. This chapter, so far, has drawn together generalised instructional strategies and trajectories from the psychological domain (Vygotsky) and the linguistic domain (Halliday) of the framework and aligned these with the phases of education described in the Montessori tradition, specifically the preschool phase (three to six years) and the early school age phase (six to nine years). The instructional strategies, drawn from the three genetic theories at the centre of this study, psychological (Vygotsky), linguistic (Halliday) and pedagogic (Montessori), suggest complementary theories of instruction.

In terms of the third domain of the meta-analytic framework, the sociological domain (Bernstein), the general instructional strategies introduced above are a function of the principles used to recontextualise specialised knowledge into pedagogic activity. These principles cover the selection of, first, what is to be taught, which, in the case of Montessori pedagogy, is educational knowledge in the European tradition, and, second, how classification and framing values (strong/weak) combine in the realisation of these specialised discourses in Montessori pedagogic discourse, where pedagogic discourse is modelled as instructional discourse embedded in regulative discourse. In the words of Bernstein (1999, p. 173n8), '[t]he recontextualising process translates the theory of instruction into a specific pedagogic form'. The evaluative rules which, in the case of Montessori pedagogy, derive from the model of the four planes of development, further specify the breaking down of the instructional discourse into manageable segments, the timing and sequencing of the segments, as well as the translation of some key aspects of regulative discourse at the interpersonal level into the material and linguistic contexts in which instruction is delivered.

Using the meta-analytical framework, it is possible to chart a multi-dimensional instructional landscape across different levels of abstraction. The complementary genetic theories of Vygotsky, Halliday and Montessori draw attention to a set of generalised instructional strategies suggestive of complementary theories of instruction. The microgenetic sequences which constitute Montessori practice can be thought of as one

particular pedagogic instantiation of a multi-dimensional complement of theories of this type. From the perspective of the Montessori tradition, contemporary proposals for instantiating Vygotsky's and Halliday's theories as pedagogy are less comprehensive and still evolving. An analysis of Montessori practice as an exemplification of a complementary theory of instruction, therefore, holds the promise of throwing light on new pedagogical possibilities for educators working within the neo-Vygotskian and/or social semiotic domains. For Montessori educators, the theoretical power of Vygotsky's and Halliday's frameworks holds the promise of foregrounding critical and defining elements of the pedagogy against the background of its instructional detail, and of revealing gaps and future directions. In both cases, Bernstein's sociology makes it possible to compare the Montessori instructional and regulative discourses with the discourse which shapes the informal learning of children from different social contexts. Such a comparison may throw light on the potential of the Montessori approach to overcome dislocations and incompatibilities between formal and informal discourses which impact on the educational success of particular groups of children.

All three of the complementary theoretical approaches which constitute the meta-analytical framework presented in Chapters 4 and 5 distinguish between everyday knowledge and educational knowledge, though the specific terms vary. First, Vygotsky makes the distinction between spontaneous and scientific concepts. Spontaneous concepts are learned informally and unsystematically in the daily interactions of everyday life in contrast to scientific concepts learnt consciously and systematically at school. Scientific concepts are organised in hierarchal meaning systems and allow humans to take part in activity which is independent of the material context. Importantly, from the Montessori perspective, Vygotsky (1986 [1934], p. 152) draws attention to the interdependent development of spontaneous and scientific concepts once a child has begun learning educational knowledge when he writes, for example, '[d]eliberate introduction of new concepts does not preclude spontaneous development, but rather charts the new paths for it'. Similarly, but on the basis of a more elaborated theory of social organisation, Bernstein (1975, p. 99; 2000, pp. 32-33; 156) distinguishes between commonsense, everyday knowledge and uncommonsense, or educational knowledge on the basis of the discourses in which these types of knowledge are realised. Bernstein's distinction also rests on the distance, or degree of abstraction, of the discourse from the material context.

In Halliday's framework the distinction between the way commonsense knowledge and educational knowledge are realised in discourse is described in terms of the three register variables, field (the social activity, including subject matter), tenor (the relationship between people communicating) and mode (how the meanings are made relevant in their context). The registers of educational discourse are shaped by the nature of the technicality of the subject matter, the type of relationship that exists between teacher and student and the degree of abstraction, that is, how far the relevance of the knowledge can be stretched beyond the immediate material context.

The sections which follow explore the discourse of Montessori pedagogy in more detail. Specifically, Montessori pedagogic discourse will be described as realising a situation type which enables the expansion of meaning potential across the three register variables of educational settings: the subject matter of educational knowledge as it is recontextualised in the Montessori objects and exercises, the nature of social interaction in a Montessori classroom, which determines how the subject matter is taught, and the passage in Montessori instructional sequences from activity dependent on the material context to abstract functioning freed from the material context. Before examining situations of this type instantiated in Montessori pedagogy, I will briefly review examples of teaching aids used in non-Montessori classrooms in order to foreground the principles on which the design of the Montessori objects is based.

6.4 A comparison between teaching aids and Montessori objects

The sample teaching aids under review in this section are sold through a catalogue distributed in 2004 by Modern Teaching Aids, a supplier of educational products located in Brookvale NSW. The company states in the catalogue that it has been supplying educational products for over fifty years. The catalogue is extensive, listing thousands of products, many commonly found in Australian schools. Some of the products are derived from Montessori designs, including moveable alphabets, sandpaper letters and Base Ten materials. The designs have been modified, however, to render these products, in Montessori terms, as mere teaching aids rather than developmental materials in the manner of Montessori objects.

The modifications to the Montessori designs involve increasing the variability of material, colour, dimensions, decoration, storage systems and activity type. For example, the literacy section of the MTA catalogue advertises materials which are variations of the Montessori sandpaper letters and moveable alphabets, with letters moulded from brightly coloured plastic or printed on cards. These materials are randomly multicoloured in highly saturated hues of red, blue, green, yellow, purple, pink and orange. The cards are decorated with animals, clowns or other child-oriented images. The dimensions of the moveable alphabets vary without apparent motivation, and are stored mixed up in buckets or drawstring bags. These materials encourage a variety of activities. They include stencils, stamps, cards with grooves for rolling ball bearings around the letter shapes, sewing and drawing cards with starting dots and directional arrows, domino games, puzzles and fishing sets.

In contrast, the Montessori moveable alphabets and sand paper letters are plain and unadorned. There are no fantasy images or decorations. The vowels are coloured red and the consonants are blue.¹⁶ The Montessori sandpaper letters are aligned to only two activities, tracing with fingers and matching to a sound; the moveable alphabets are designed for composing and for word study activities. The Montessori moveable alphabets are displayed in boxes, with fixed compartments for letters of fixed dimensions.

Similarly, the mathematics section of the MTA catalogue includes materials derived from Montessori designs, but with an explosion of variation which makes them unusable in Montessori pedagogy. These include randomly multicoloured and multi-dimensional geometry shapes, fraction circles and bead frames made from plastic, as well as Base Ten material in wood and plastic. There are also multicoloured and multi-dimensional plastic counters varying in shape from circles to pegs, to fruit and cars, as well as multicoloured plastic animals such as worms, fish, teddy bears, dinosaurs, camels and koalas. The koalas are designed to fit into small rectangular white 'cars'. While some 'cars' are designed to fit ten koalas, others have spaces for only four, an odd choice when the target number system is based on ten. The catalogue endorses the materials on the basis of the following attributes: 'brightly coloured', 'cute', 'tactile', 'bold colours', 'strong colours'. The catalogue also suggests the following activities: counting, patterning, sequencing,

¹⁶ Some manufacturers of Montessori materials reverse this colour scheme, erroneously in my opinion. The colour red is repeatedly used as an indicator of salience in Montessori materials, so reversing this convention when presenting the letters of the alphabet seems inadvisable.

weighing, sorting, early number skills and hand/eye co-ordination. The catalogue's implication is that the number of pedagogical uses is only limited by the teacher's imagination and creativity. It is therefore understandable that Montessori educators are often perceived to be inflexible, unimaginative and out-of-date for rejecting colourful and novel teaching aids with multiple attributes and imaginative possibilities, such as those described above, and for choosing instead the comparatively austere Montessori objects.

The design details of the Montessori objects remain unchanged from decade to decade and are displayed in the classroom and presented to the children in prescribed ways for specified purposes. In the Montessori tradition it is the constrained variation of design and use which underwrites the developmental qualities of the material. Any variation in the material, a change of colour, size, shape, movement or language, encodes a meaning relation which construes the field of the educational knowledge being learned. Further, to draw children's attention away from the concepts being learned, such as counting or addition, to concepts from different fields of knowledge and different orders of abstraction, such as animals or cars, is considered in the Montessori tradition to be distracting and confusing.

When describing the lessons of 'public school' teachers in the first decade of the twentieth century, Montessori (1964 [1909/1912], pp. 110-111) criticises the 'confused mass of ideas', including the sky and aprons, cherries and burning coals, used by one teacher to teach children to discriminate between the colours blue and red, and another teacher's lesson in which little cardboard dancers were used to teach addition. Montessori comments:

If I remember the dancers more clearly than I do the arithmetic process, how must it have been with the children?

In this way Montessori critiques the long-held belief that educational knowledge needs to be embedded in the idiom of fantasy narratives, of 'cuteness' and of maximal variation in order to make it accessible and palatable to young children. In Vygotsky's terms, this approach locks children into the associative complexes of an adult's view of the interests of infancy, that is, a collocation of fragments of educational knowledge and fragments of fantasy and popular culture, instead of directing children's attention in a straightforward way to the concept in question and, thereby, opening up a decontextualisation pathway with the potential to lead to the abstract use of the concept. An infinite variety of possible

associations between contextually-unrelated phenomena and diverse registers has the potential to fragment children's attention and meaning-making, to set up relations which constitute aggregates of contextually-fragmented meanings, for example, the relations between an arithmetic process within the base ten system and dancers, or cars, or koalas. Such approaches work against children gaining independence, because a teacher is always required to select the relations which are meaningful in the context of the lesson.

Nevertheless, a significant common understanding underlies the educational products in the twenty-first century catalogue, the early twentieth century teacher's cardboard dancers and Montessori's objects. This is the understanding that young children learn through play-like activity with concrete objects. In the following sections the discussion of selected Montessori objects and their use exemplifies how activity with concrete objects designed to direct attention in specific ways has the potential to leave children with an impression, or outline, of the semantic domains in which the abstract meanings of educational knowledge are located, thus, to open up a pathway leading towards later symbolic control of these meanings.

6.5 Recontextualising educational knowledge

The recontextualisation of educational knowledge in Montessori pedagogic discourse includes not only the recontextualisation of academic knowledge, produced in the university or equivalent, but also the recontextualisation of everyday and manual knowledge, from the home and the workshop, and expressive knowledge from the fields of creative arts. This section will review the recontextualisation, and the interrelation, of these three types of knowledge in Montessori pedagogy.

Montessori pedagogy comprises an array of didactic objects which combine with movement and language in sequenced activities systematised into a web of detailed instructional pathways known as *Prepared Paths to Culture* (See Illustration 6.2). These pathways are materialised in the classroom environment because each object, or set of objects, has a specified location on a shelf, the physical location reflecting its location in the child's progression through the curriculum.

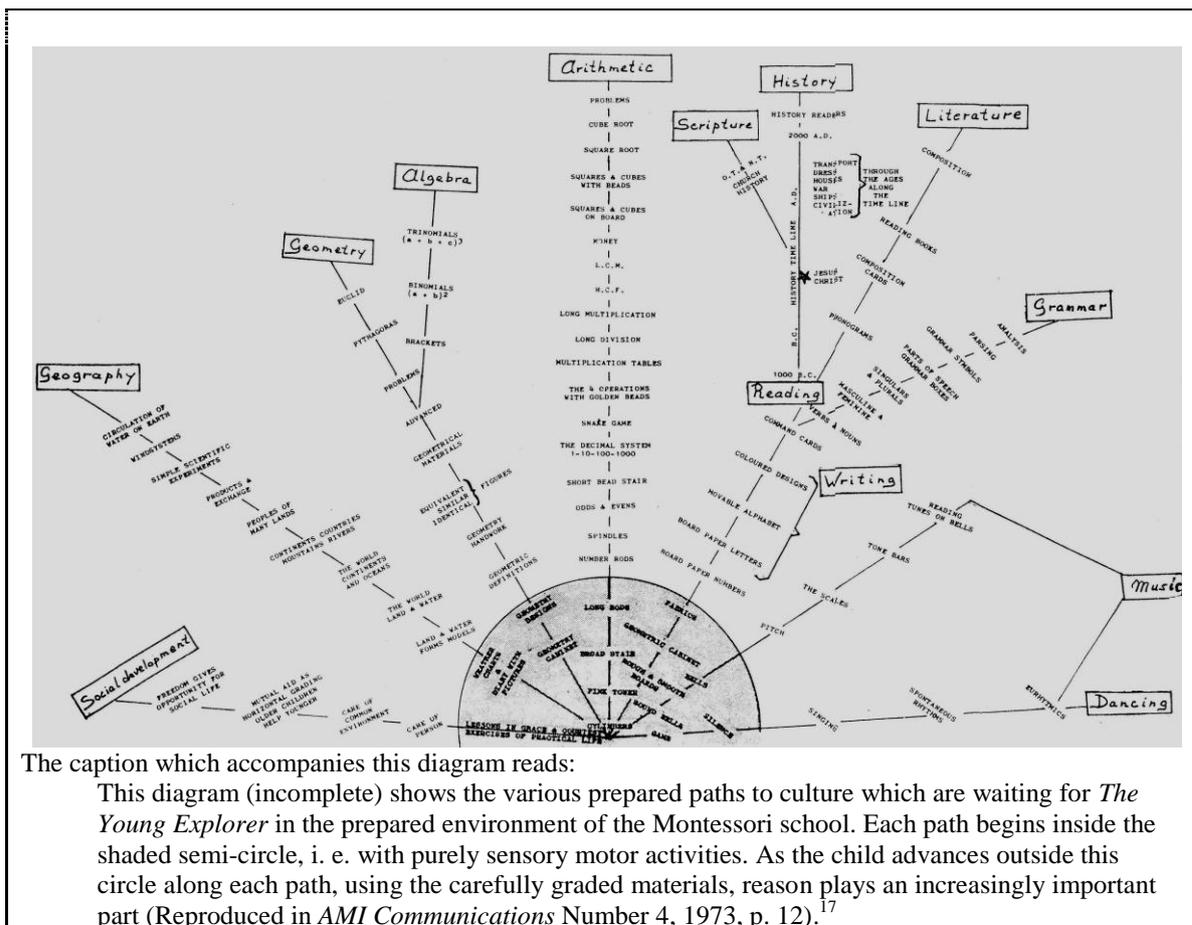


Illustration 6.2: Prepared Paths to Culture

The pathways originate in activities designed for infants and culminate in activities designed for twelve year old children. The web of pathways fans out into the various disciplines of educational knowledge from the starting point of two foundation areas of the Montessori curriculum located in the Children's House environment for preschool age children: *the exercises of practical life* (bottom left hand ray in the diagram) and *the sensorial exercises* (shaded semi-circle at bottom centre of the diagram). The foundation areas prepare children for interaction with educational knowledge in terms which resonate with Vygotsky's and Bernstein's frameworks. The extension of the pathways beyond the shaded semicircle represents the Cosmic Education curriculum for children from six to twelve years.

The Children's House practical life exercises recontextualise the social and manual knowledge of the home and the workshop into routinised activity sequences designed to develop conscious and voluntary control of attention and movement. These exercises are

¹⁷ This diagram is incomplete because the Science path is missing.

also designed to be the foundation for the social and physical independence which underpins the liberty a child is given in a Montessori classroom. The exercises of the senses recontextualise everyday empirical knowledge into sets of objects which materialise this knowledge in the form of hierarchical, taxonomic systems, foreshadowing the systematic organisation of educational knowledge.

The paths initiated by these exercises recall the description by Butt (2004, p. 236) of the teacher's threefold task, that is, displacing 'local representations', disturbing what is perceived to be self-evident and commonsense, and trying 'to reconcile ... abstraction with common, recognizable, experience', a task which results in the 'semantic complexity' of pedagogic discourse. In Montessori pedagogy this complexity finds its expression in the design of the objects, the use of the objects and the accompanying language use. The means for analysing the use of the objects and the accompanying language use as a unit of meaning, the *ensemble* text type, is presented in Chapter 5. This analytical tool will be applied in the remainder of this chapter to representative examples selected from the Montessori practical life and sensorial exercises.

In Sections 5.6 and 5.7 of the previous chapter the folding cloths, a preliminary practical life exercise, was used to exemplify the stages and features of the Montessori ensemble. The ensemble unfolds through three stages: the presentation stage, the stage of independent work and the extension stage. The first stage, the presentation stage, is the stage of interaction between teacher and child. Learning is a function of the child's independent work in the second stage of the ensemble, as Montessori (1967 [1948], p. 252) describes in the following way:

... in our method a lesson is only an explanation of an exercise. By far the most important element is the work of the child himself in repeating it over and over again

Evaluating the child's ability to apply and benefit from that learning is a function of the third stage of the ensemble. The following indexical features of a Montessori ensemble emerge from that description:

- the presentation of Montessori objects as **elements** in a dynamic interactive **activity sequence** and the **imitation** of this sequence by the child
- the conclusion of the activity sequence in a final **synoptic array** of objects representing as a system a quantum of educational knowledge

- the use of **indication** in the presentation stage as a means of regulating attention, as a precursor to reflection, and as the origin of the generalisation-abstraction developmental pathway
- the child's increasingly **independent use** of the objects in the second stage culminating in the child's independent **decontextualised** and **recontextualised use** of the knowledge in the third stage

The following sections will review the structure and features of the Montessori ensemble text type, first from the perspective of the exercises of practical life, and second, from the perspective of the exercises of the senses.

6.6 The exercises of practical life: voluntary control and independence through practical activity

6.6.1 Developing independence and training the 'will'

The exercises of practical life represent a link between the small child's home culture and the culture of the Montessori Children's House. Practical life exercises are customised both to the home culture of the children in the class and to the specific needs of the Montessori environment, thus building a link between the home culture and school. They are real life activities using fully functional objects, not toys, which are matched to the size of a child's hand and strength. The exercises are designed to lead to the mastery of the everyday tools of the child's culture as well as the regulation of their own behaviour, and thus, to enable social and physical independence at home and at school.¹⁸ They have been described as 'exercises in domesticity' which impose 'an external order on the process of learning even as they make predictable how children will act in society at large' (Jane Martin 1994, p. 97).

¹⁸ Although there are traditional exercises of practical life which recur in most Montessori classrooms, these exercises are adjusted to match the child's home culture across time and space. For example, a museum in the factory which produces Montessori equipment in the Netherlands displays early twentieth-century materials with which children practised buttoning boots with button hooks and lacing old-fashioned skates. In Aspen, Colorado, in the present day, children learn to fasten ski boots. In Indian Montessori schools children grind spices and use small spindles for spinning cotton just like the one Gandhi used (See Wilson 1987, p. 136; p. 194; p. 248). In Japanese Montessori schools children learn a variation of the Tea Ceremony.

The more abstract purpose of the exercises of practical life is, in the tradition of Séguin, to develop the child's *will*. Montessori (1964 [1909/1912], p. 366) argues against the common belief of her era that to socialise children it is necessary to break their will:

... this idea is irrational because the child cannot give up what he does not possess. We prevent him in this way from forming his own will-power.

As a result, prizes or punishments forcing children to comply with adult standards of discipline are not used in Montessori schools.¹⁹ Instead Montessori (1964 [1912], p. 350) argues '[t]he first dawning of real discipline comes through work' in which a child is 'keenly interested'. She observed that children in the second phase of infancy are very interested in learning social customs and in being included, meaningfully, in every day social life. For children of this age, there is, therefore, a sensitive period which the exercises of practical life are designed to exploit in the service of building and extending voluntary control and attention. This sensitive period manifests itself in the small child's desire to imitate the behaviour of others.

In line with Vygotsky's endorsement of **imitation** as a learning strategy (as presented in Section 4.4.2), Montessori (1982 [1949], p. 146) describes a child's imitation as 'a selective and intelligent imitation, through which the child prepares himself to play his part in the world'. This imitation manifests itself in cycles of activity marked by intense effort. If a child is to construct the will successfully, Montessori (1982 [1949], p. 139) stresses that these cycles of activity should not be interrupted:

... whatever intelligent activity we chance to witness in a child - even if it seems absurd to us, or contrary to our wishes (provided, of course, that it does him no harm) - we must not interfere; for the child must always be able to finish the cycle of activity on which his heart is set.

That children from the age of two and a half to five or six are interested in learning about the activities which comprise everyday social processes, and the participants who take part, relevant to their family and community culture is supported by the data Painter (1999a) uses to describe the language learning achievements of her own child at this age.

¹⁹ Montessori (1964 [1909/1912], p. 21) described prizes and punishments as 'instruments for slavery of the spirit' equivalent to the benches nineteenth and early twentieth century children were forced to sit on in silence without moving. The liberation of children from these 'yokes' was, for Montessori (1964 [1909/1912], pp. 14-27), part of the process of human liberation from all forms of slavery, including the slavery experienced by servants and workers, and 'the sexual slavery of woman'. She even argued for liberating aristocrats from their unnaturally extended childhoods brought about by their dependence on servants to do things adults should be able to do independently.

Painter's data reveal the child's desire to learn about both the steps which make up everyday activity sequences and the taxonomy of participants taking part in these activities. While familiar social processes do not necessarily involve many linguistic acts, Painter (1999a, p. 59) argues that:

... all the activities constituting the social processes are meaningful, and the 'knowledge of the world' brought into play in carrying them out and interpreting their linguistic component is itself semiotic in nature.

To imitate everyday social activities, children must be able to use their *senses* to identify objects and their function, for example, by discriminating size, shape or colour, and they must bring their *movements* under voluntary control. Resonating with Vygotsky's account of the re-organisation of elementary functions into higher mental functions (as outlined in Section 4.3), Montessori (1982 [1949], p. 122-123; emphasis on original) directly links the development of sensory discrimination and controlled movement with the development of the higher functions of consciousness, arguing that it is through these means 'that the higher life expresses itself' whenever action is '*connected with the mental activity going on*'. This is because conscious, directed discrimination and movement are a function of voluntary control, as Montessori (1982 [1949], pp. 123-124) explains in the following way:

... the child uses his movements to extend his understanding. Movement helps the development of the mind, and this finds renewed expression in further movement and activity. It follows that we are dealing with a cycle, because mind and movement are parts of the same entity. The senses also take part, and the child who has less opportunity for sensorial activity remains at a lower mental level.

Now, the muscles directed by the brain are called voluntary muscles, meaning that they are under the control of the will, and will power is one of the highest expressions of the mind. Without the energy of volition, mental life could hardly be said to exist. Hence if the voluntary muscles are directed by the will they must form a kind of organ of the mind.²⁰

Sensory discrimination and movement are considered to be, in the Montessori tradition, 'the outward manifestations of [a child's] choice' and are 'accomplished by the manipulation of objects, by a continuous muscular activity' (Standing 1962 [1957], p.236). In semiotic terms, sensory perception and movement represent meaning-making resources in a Montessori ensemble; thus, variation in sensory discrimination and

²⁰ Montessori (1982 [1949], p. 126) contrasts traditional schools, in which mental and physical activities are separated and alternated, with her own schools, in which 'the mental life shown by our children brings the whole of their musculature into constant use'.

movement is constrained on the basis of the context of use, and a child's choices must be directed by meaning and brought under conscious control.

The role of movement in ontogenesis is foregrounded by Montessori (1982 [1949], p. 126) because she recognises it as a social phenomenon.

The life of man, and of the great human society, is bound up with movement. ... The very existence of the social order depends on movement directed to constructive ends.

Dancing, for example, Montessori (1982 [1949], p. 128) describes as, 'the most individual of all movements', noting that 'even dancing would be pointless without an audience; in other words, without some social or transcendental aim'. Movement, in the Montessori tradition, develops along two separate, but related lines: the development of equilibrium, that is 'of walking and keeping one's balance' and 'the development of the hand' (Montessori 1982 [1949], p. 132). Hands in particular are 'connected with mental life' because the movement of the hands is not predetermined but must be developed from the earliest months of life under the conscious direction of the intellect. It is 'thanks to the hand', 'the companion of the mind', Montessori (1982 [1949], p. 131) argues, 'that civilisation has arisen.'²¹

In the next section, following Bernstein, the exercises of practical life will be examined in terms of the two strands of pedagogic discourse into which the primary knowledge of the home and the community is recontextualised in Montessori pedagogy: the content, or instructional discourse, and aspects of the social order through which the content is delivered, the regulative discourse (See Section 5.8).

6.6.2 Practical life as instructional discourse

The exercises of practical life recontextualise the customs of both the home and school communities into instructional discourse in the form of highly determined activity sequences. These sequences are based on the predictable, everyday ways people in the culture relate to each other socially, as well as predictable, everyday activities such as dressing and washing up. All the exercises of practical life have the same status in the

²¹ This account is a summary of the lecture 'The importance of movement in general development' published as Chapter 13 of *The Absorbent Mind* (1982 [1949], pp. 120-136). An earlier version can be found in Chapter 5 of *The Discovery of the Child* (1967 [1948], pp. 76-98) entitled 'Education in movement'.

classroom as activities oriented to educational knowledge, such as mathematics or reading. They are roughly divided into two areas, *social relations* and the *care of the self and the environment*.

The exercises in social relations are known as the *lessons in grace and courtesy* and are presented in the form of small role-plays in which children imitate movements or spoken exchanges acted out by the teacher, or more expert child. These lessons focus on controlling movement and the conventional use of language in social interactions, including, for example, greetings and leave-takings, interrupting and apologising. When a child is still adapting to the environment, for example, when a child's loud movements disturb others, the child's attention will be immediately redirected to an activity of interest, but on another day the teacher might present to the whole group a grace and courtesy lesson which shows everyone how to move quietly without singling out the child to whom it is directed.²²

Among the first lessons children experience on entering the Children's House, around the age of three, are the *preliminary exercises* to develop precise fine motor movement, in particular the pincer grip using the fore-finger and the thumb. As well as the folding activity described in Chapter 5, these exercises include using a spoon or pegs, and pouring. In the Montessori tradition, children around the age of three are perceived to have a heightened interest in precise movement, which holds their attention during these exercises. The mastery of precise movement gained through these exercises is exploited when the child's interest evolves into that of achieving a social goal. At this point the teacher presents exercises which combine the preliminary movements into more complex activities through which children learn to care for themselves and their environment, for example, washing hands, using buttons, tying laces and bows, washing tables or arranging flowers. Because children learn the use of the practical life objects through imitation of

²² The lessons in grace and courtesy include activities constituted by language, in which movement is ancillary. These include lessons in how to greet people, how to make an offer or a request, how to say thank you, how to interrupt, how to listen and how to apologise. Activities constituted by movement, in which language is ancillary, include how to open a door, how to walk in the classroom, how to let someone pass, how to carry a chair, how to unroll and roll up a floor mat, how to choose objects and how to return them to the shelf.

the teacher's presentation, language use merely accompanies the activity, either as naming of the objects or as self-talk during the child's independent work.²³



Illustration 6.3: The exercises of practical life on the shelf

In the *presentation stage* of the ensemble the teacher demonstrates a sequence of pre-analysed and rehearsed actions, or, in the case of lessons in grace and courtesy, pre-analysed language conventions and gestures.²⁴ The teacher introduces the activity sequence by telling the child the name, and purpose, of the activity. The activity itself, however, is largely dependent on the context, and language is only used during the activity if needed, in accord with the Montessori maxim, '[e]very useless help is an obstacle to development' (Montessori 1946, pp. 59- 60).²⁵

The presentation stage features **indication** as a means to give salience to a critical movement, an object or part of an object as a *point of interest*. This is achieved by the pointing gesture, by framing a movement with a rehearsed exaggerated hesitation, or, less often, by naming. For example, the teacher might pause theatrically just before a liquid being poured tips over the lip of the jug and use exaggerated gestures to indicate the

²³ Before a child is presented with a practical life activity sequence, the teacher ensures the child knows the name of the objects used in the sequence. If necessary, this is achieved through matching and naming games using pictures of these, or similar, objects, organised in sets classified according to function. For example, picture sets for vocabulary extension might include cleaning or cooking equipment, cutlery and crockery.

²⁴ During training, and before the practical examination, student Montessori teachers rehearse the movements for each presentation, and throughout their careers teachers often rehearse the movements to prepare for presentations. This applies not only to presentations of the exercises of practical life, but to presentations across the curriculum for children up to twelve years of age, especially presentations, for example in the area of mathematics, in which maintaining precision and accuracy is important if children are to successfully learn the concepts encoded in the objects and movement.

²⁵ The activity sequences used in practical life, and other, presentations can be given semiotic reality in the form of a procedural text. In fact, almost all educational knowledge is packaged in the Montessori curriculum as series of activity sequences, recorded by Montessori teachers during their training in the form of procedural texts. The albums of procedural texts used by Montessori teachers to guide their practice can give the impression that Montessori pedagogy is a series of 'recipes'.

salience of the coloured tape marking the levels on the container within which to stop pouring. The ‘practical’ use of **indication** in the exercises of practical life to regulate attention and movement initiates the process of reflection, a microgenetic echo of the role of indication as the origin of the Vygotskian ontogenetic pathway towards generalisation and abstraction. As Hasan (2005 [1992], p. 72) writes, ‘a process that can be voluntarily regulated can become the object of reflection, or ‘intellectualization’ ’.

The second stage of the ensemble, the child’s *independent work*, is the learning stage. The preparation and analysis which precedes the presentation stage contributes to the child’s ability to work independently during the second stage. The stage of independent work features **imitation**, the child’s contribution to the dialogic, collaborative meaning-making of the ensemble.

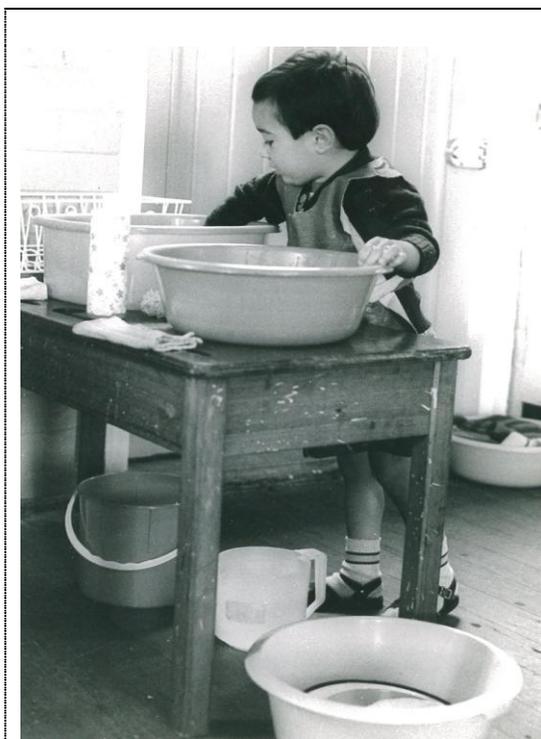


Photo: Candy le Guay (1984)

Washing up



Photo: Nienhuis Montessori (2006)

Shoe polishing

Illustration 6.4: The second stage of practical life ensembles (independent work)

As the child repeats and practises the activity through **imitation**, the material itself reveals errors of control or sequence, for example, objects which do not match in colour or function, a broken glass or spilt liquid. Errors are controlled by the material and the procedure, the laws of physics and social undesirability - the breakability of glass, the spillability of liquid and rice, the distracting and discordant noise of a dropped or poorly-

carried chair, the failure to achieve the goal because of a failure to follow the necessary steps. Such errors are opportunities for further teaching and further interaction, for example, a lesson in sweeping or wiping up liquids or assistance from more adept children. Each successfully learned lesson gives the child more freedom and more choice in the environment.

Over time, and with **repetition**, for each child, practical life sequences become stabilised, functional and meaningful classroom routines. Repetition of this type is valued in a Montessori classroom because it aids ‘the natural evolution of voluntary action’ (Montessori 1964 [1912], p. 351). This is the third stage of a practical life ensemble. During the third stage, the content of the practical life exercises evolves into the way regulative discourse is realised in the classroom.

6.6.3 Practical life as regulative discourse

The foundation of Montessori pedagogy is the liberty of children in the classroom. Echoing Locke and Condillac, this liberty evolves in tandem with a child’s developing ability to use the semiotic resources of the classroom to regulate the self, consciously and independently. Children, who are not yet socially independent and who are not yet able to make conscious choices about their behaviour, however, are not abandoned. As Montessori (1982 [1949], p. 179) writes, possibly in response to criticism from progressive educators that her method was too rigid:

‘To let the child do as he likes’, when he has not yet developed any powers of control, is to betray the idea of freedom.

Explicit teaching of activity sequences and extended opportunities to practise them are used to develop each child’s ‘powers of control’. Freedom in this sense means to bring some aspects of the classroom’s regulative discourse, as much as the instructional discourse, under the conscious control of the children themselves.

As described in the previous section, the exercises of practical life recontextualise social relations and processes as instructional discourse, or content. This instructional discourse evolves into the means of control which underpins a child’s liberty in the classroom. In other words, it becomes a regulative discourse, into which further units of instructional

discourse are later embedded. The regulative discourse, first experienced by children as instructional discourse, is also realised in the multimodal ensembles. The multimodal means of control become the ‘frame’ in which content is embedded in the ensembles, in some instances in an almost literal representation of Bernstein’s metaphor (See Section 5.6.3.).

The role of the practical life activities in the regulative discourse of a Montessori classroom can also be considered from the perspective of semiotic mediation. The purpose, from the child’s perspective, of each practical life activity is expressed linguistically in its name, for example, ‘the folding cloths’ and ‘table washing’, and materially it is expressed as a completed task such as a clean table, or as an array of folded cloths. The names of the objects and the name of the exercise, combined with the teacher’s semiotically-charged performance of the activity sequence, provides the child with semiotic tools to represent to his or herself, both in practical action and language, the steps of the activity sequence and the goal. That children use such tools, and direct them internally, is suggested by the ‘hum’ of self-talk accompanying children’s activity reported by teachers in the Montessori Children’s House, especially in the case of children up to the age of about four.²⁶ Similarly, ‘ongoing commentary’ related to activity ‘enacted, observed and recalled’ is a feature reported by Painter (1999, p. 143) of her child’s language at a comparable age. Painter’s suggestion that this ‘verbalization helps the child to build up expectations of sequences’ portrays the child’s ongoing commentary as a function of semiotic mediation.²⁷

Modelling of semiotic mediation by Vygotsky, however, was not in the context of domestic activity, but in the context of official educational knowledge. This is particularly true of his interpretation of the different reasoning styles of the educated and uneducated subjects of experiments carried out in Uzbekistan in the 1930s, as reported by Luria (1979). The reasoning of the educated subjects was interpreted as representative of higher, sociogenetic mental functioning, in contrast to the mental functioning of the uneducated subjects, interpreted as a more rudimentary form of sociogenetic functioning. In contrast,

²⁶ As recounted, for example, in personal communication with Fiona Campbell (Principal, Inner City Montessori School, Balmain NSW), July 2006.

²⁷ Recording and analysing the ongoing commentary accompanying children’s activity in a Montessori Children’s House holds the promise of revealing insights into the evolving relation between the child’s imitation of the remembered actions performed by the teacher and the child’s attempts, through self-directed sign use, at achieving a future goal.

Hasan (2004, p. 161) argues that '[t]he primary function of semiotic mediation in the life of young humans is to enable the internalization of cultural designs essential to everyday living', an internalisation achieved by the uneducated Uzbekis no less than the educated ones. In other words, the process of learning the mundane, everyday knowledge of a culture is a sociogenetic achievement comparable to learning the educational knowledge of the culture, and thus entails the 'emergence of voluntary regulation' and the development of culturally-based higher mental functions. Further, Hasan (2004, p. 162), draws attention to Bernstein's argument that to learn 'disembedded [educational] knowledge presupposes a sense of its relevance on the learner's part' and 'to succeed in this enterprise' learners need to acquire 'a favourable mental disposition, which itself is fashioned in the experience of everyday life'. Hasan's arguments provide theoretical support for Montessori's appropriation of the experience of everyday life into pedagogic discourse. The opportunities children in Montessori classrooms have to exercise and enhance higher mental functions, including voluntary self-regulation, in the context of everyday cultural activities may go some way to explaining the reported educational success of Montessori children from a range of social contexts, including contexts not normally associated with such success. A more complete explanation, however, would require an investigation of the relation between the variety of 'everyday life' recontextualised in specific Montessori classrooms and the varieties experienced by the children at home.

The following section examines in more detail the practical life exercise, washing tables, as a realisation of the ensemble as text type.

6.6.4 A sample practical life exercise: washing tables

Table washing is a popular practical life exercise in most Montessori classrooms. It is learnt in the Children's House, but becomes a meaningful unit of patterned activity, a 'text type', children transport into the school years, for example, to clean up after art, science or a meal. In the Children's House the exercise incorporates both vigorous movement and water play in a series of activity sequences, demanding quite sophisticated levels of fine motor control, and hence concentration and reflection, if the child is to complete the task successfully. Table washing expands the 'ensemble' pattern established by preliminary

activities, such as the folding cloths, and represents a greater challenge because, rather than one activity sequence, it combines a series to achieve the purpose of the exercise.

In the presentation stage of table washing the series of activity sequences is demonstrated by the teacher. The series of activity sequences is framed by an opening and a closing phase. The presentation stage is outlined in Table 6.2.

<i>Opening phase</i>	<p>The teacher opens the presentation by:</p> <ul style="list-style-type: none"> - establishing a need for the activity (a dirty table) and inviting, through gesture and language, the child to respond - indicating the location of the table washing set on the practical life shelf - carrying the set to the table - setting up the objects in an array - putting on apron, fetching and pouring water
<i>The series of activity sequences</i>	<p>The teacher presents the following activity sequences, indicating points of interest in the use of the objects and offering the child a turn, that is, an opportunity to imitate use of the objects, at appropriate moments in each sequence.²⁸</p> <ul style="list-style-type: none"> - dampening the table 'parallel vertical strokes from left to right with a sponge' - scrubbing the table 'rows of anticlockwise circular movements from left to right with a brush, large circles on the table top and small ones around the edges' - rinsing the table 'parallel vertical strokes from left to right with a sponge' - drying the table 'rows of anticlockwise circular movements from left to right with a cloth, large circles on the table top and small ones around the edges'
<i>Closing phase</i>	<p>The teacher closes the presentation by:</p> <ul style="list-style-type: none"> - cleaning up - returning objects to their array - putting the objects away <p>The child takes a turn as appropriate.</p>

Table 6.2: The presentation stage of the table washing ensemble

The *presentation stage* is followed by the child's *independent work* which involves **imitation** and **repetition** of the exercise. After several repetitions children start to

²⁸ If a child wants to do the activity but is not ready for the whole series, a series of two, rather than four, sequences is presented. Extra sequences can be added to make the series more challenging for older children.

memorise the whole series. The *extension stage* of the ensemble is instantiated when a child uses table washing independently as an enabling activity in another context of use, for example, art or science.

A review of the *ideational meanings* in the table washing ensemble reveals the use of redundant multiple representation to enhance the child's chance of independent success. This redundancy is immediately visible in the colour-coding of **elements** of the ensemble ('red mat', 'red apron', 'red bucket', 'red basin', 'red dish', 'red brush', 'red sponge', 'red cloth', 'jug with red line') to reinforce the classification of these elements, first, as a set stored together on the shelf, and second, on the basis of a shared function (table washing). The common colour (in this example, 'red'), as a **part** of each element, is the semantic equivalent of the lexical relations **collocation** and **repetition** used to tie ideational elements together to contribute to the cohesion of text (See Section 5.6.3). A second example of redundancy is the organisation of the elements into an **array** which anticipates the sequence of their use, as seen in Illustration 6.5.

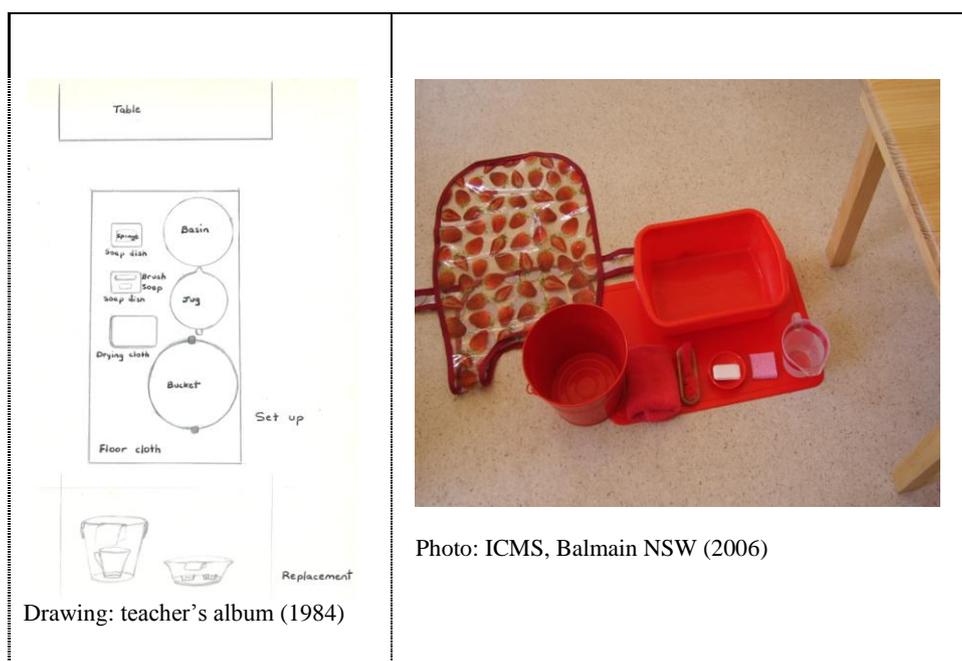


Illustration 6.5: Table washing set up (array) and colour-coded elements

The **elements** of the table washing ensemble, movements and objects, are combined and recombined into dynamic **figures** organised into **activity sequences** on the basis of temporal relations. The figures include very precisely executed movements, matched to particular objects, and repeated cohesively across the sequences, that is, the parallel

vertical strokes from left to right are matched with the sponge in dampening and rinsing, and the anticlockwise circular movements from left to right are matched with the brush for scrubbing and the cloth for drying. These movements foreshadow the movements of handwriting. Two figures from the table washing ensemble are pictured in Illustration 6.6.



Illustration 6.6: Table washing figures

Interpersonally the table washing ensemble is enacted as a response to a dirty table, which can be understood as a **command** demanding action. The set of table washing objects on the shelf **offer** the child the possibility of activity, reinforced by the teacher's invitation through gesture and language. The teacher's presentation of the figures of an activity sequence to a child can be interpreted as the steps of a procedure, or **commands**. Educational knowledge, that is, knowledge about movements related to handwriting (as expressed in **statements** such as *Writing moves from left to right.*), is constructed through independent use of the objects.

Textual meanings in the table washing ensemble include the cohesive ties used to organise ideational meanings, as described above. Textual meaning is also used to direct and regulate the child's attention. First, the mat **frames** the array of objects, giving the objects **salience** relative to other objects in the classroom and regulating the child's attention. A pointing gesture, or exaggerated hesitation, combined with the redundant use of language, **indicates** and **frames** points of interest. Redundant language use is likely to be **labelling**, in a construction in which **exophoric reference** (the external orientation) is **given** information and the name (the internal orientation) is **new** information. For example, the teacher might say when indicating the red line on the jug, *This is the water level.* The child's attention might also be directed to other points of interest, using indication, for example, the lines of water drops and circles of suds made by the movements.

Organising ideational meanings through redundant cohesive ties and the directing and regulating of the child's attention during the presentation stage, enables the second stage, independent work. During this stage, through imitation and repetition, children gain mastery over the everyday tools of the culture (external orientation of the ensemble) and the regulation of their own behaviour (internal orientation of the ensemble). In the third stage of practical life ensembles, children use this mastery to engage with the intellectual tools of the culture, as these are presented in Montessori pedagogy. The doorway into intellectual culture, in the tradition of Condillac, is opened by the *exercises of the senses*. The next section describes how the meaning systems introduced in the exercises of practical life are elaborated and redeployed in the exercises of the senses in order to build an intellectual foundation for the development of educational knowledge.

6.7 The exercises of the senses: controlling hierarchical meaning systems through practical activity

6.7.1 Materialised abstractions

The *exercises of the senses* are sets of graded objects, with design specifications as precise as those of scientific instruments, used by children in the Montessori Children's House (three to six years). This developmental period is described by Montessori (1964 [1909/1912], p. 216) as a time in which the child's sensory exploration has the potential to build an 'ordered foundation upon which he may build up a clear and strong mentality'.²⁹

The sense exercises are the most iconic of all Montessori objects, representing Montessori's elaboration of the apparatus Séguin designed as 'matrices of comparison' (See Section 4.4.3). While working with these exercises, the child's attention is directed progressively from 'a few stimuli strongly contrasting, to many stimuli in gradual differentiation always more fine and imperceptible' (Montessori 1964 [1909/1912], p. 184). While matching and grading the objects, the child is manipulating relations of contrast and similarity, developing the 'great intellectual activities' of attention and judgement. The active comparison built into the exercises affords an intellectual training

²⁹ This account of the exercises of the senses in this section is taken from Montessori albums prepared during the inaugural course of the Sydney Montessori Teachers' College (1983-84).

based on ‘a *polarisation of the attention and the repetition of the actions* related to it’ (Montessori (1965b [1916/1918], p. 60; emphasis in the original).

The sense exercises follow the pattern established in the exercises of practical life. *Ideationally*, each exercise comprises a dynamic interactive **activity sequence** during which the child manipulates and compares the objects culminating with the objects arranged synoptically in a final array. The sequence is made up of **figures** centred on the process of comparing like **elements** (eg tablets, cubes, cylinders, insets) in terms of their contrasting **parts** (eg colour, shape, size, texture). Unlike a practical life sequence made up of figures which only achieve the final purpose if a fixed temporal order is followed, the figures in a sense exercise are directed towards a final synoptic array in which the elements are related on the basis of comparative value. *Interpersonally*, during the sequence, the figures are conflated with **offers**, inviting the child to match or grade the objects.

The sense material is described by Montessori (1967 [1948], pp. 176-177) as ‘materialised abstractions’ guiding children’s observation:

It provides a child with color, size, shape, smell, and noise in a distinct, tangible, and orderly graded manner that permits him to analyze and classify these qualities. ... The material opens up to [children’s] intellects paths that would otherwise be inaccessible at their tender age.

The graded objects materialise, as entry-level meaning systems, the abstract means employed in the wider culture for attending to, ordering and classifying otherwise random sensory impressions, including sensory impressions of texture, colour, volume, mass, length, taste, temperature, sound and shape. The exercises regulate children’s attention to qualities classified in a way which, Montessori (1982 [1949], p. 159) claims, transforms them into a sensory “‘alphabet” of the outer world’. This limited set of qualities then becomes for children ‘a key to the doors of knowledge’ because it enables them to ‘read’ the infinite number of objects in the world in a culturally meaningful way.

That small children are interested in classifying their experience in accord with the categories used in the cultural context is demonstrated in Painter’s study (1999, p. 78). This interest is, in the Montessori tradition, the manifestation of a sensitive period. When a small child manifests an interest in a sensory quality, the teacher presents the set of objects which isolates and classifies this quality. The child’s interest leads to repeated use

of the set of objects, which progressively structures and stabilises the child's attention to the quality in a culturally salient way.

Manipulating the objects and organising them, and, therefore, manipulating and organising the comparative relations materialised in the objects, structures children's attention to correspond with the ways the culture in general attends to the sensory property isolated in the objects. In other words the objects represent a form of sensory semiotic mediation, externalising meaning relations in a concrete form which children can manipulate. Because the meaning relations are materialised as external objects for conscious reflection, they have the potential to be internalised and intellectualised, in accord with the sociogenetic pathways described by Vygotsky (See Section 4.3.).

In each set of graded objects one sensory property, or quality, varies from object to object while all the other properties remain constant. For example, the ten cubes of the pink tower are constant in colour (pink), texture (glossy painted surface), and material (wood), but the sides of each cube vary in dimension, a centimetre at a time, from one centimetre to ten centimetres. The varying property is isolated and the child's attention is drawn to this property, limiting 'the field of the child's consciousness to the object of the lesson' (Montessori 1964 [1909/1912], p. 224).³⁰ In the case of the pink tower, children experience variations in the property of volume, materially, as a series of ten cubes, increasing in volume from 1cm^3 to 10cm^3 , as seen in Illustration 6.7.

³⁰ Use is often made of blindfolds, silence and darkness to further isolate the attributes, for example, giving 'exercises on the sense of hearing ... in an environment not only of silence, but even of darkness' (Montessori 1964 [1909/1912], p. 179), and giving exercises on the sense of touch after handwashing. Montessori found that handwashing, blindfolds, darkness and silence helped to focus the attention of normal children, but it often distracted or distressed children suffering developmental impairment.

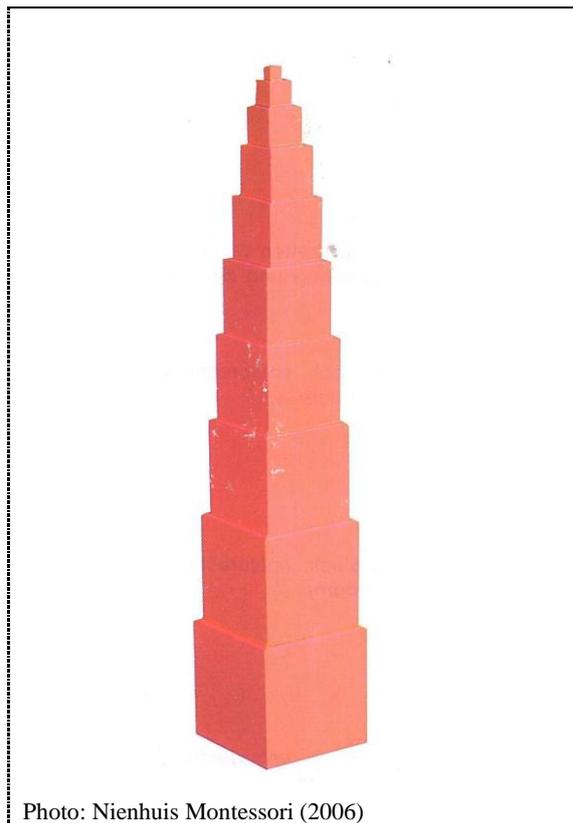


Photo: Nienhuis Montessori (2006)

Illustration 6.7: The pink tower³¹

Each set of objects has a designed-in control of error which limits the way a child can put the objects into relation. The control can be mechanical, for example, a frame shaped to fit one particular inset, or it can be one that depends on the child's perception of harmony. For the pink tower to remain stable, and to be visually harmonious, the cubes must be placed in order, progressing from the largest at the bottom to the smallest at the top. To meet the demands of the control of error, the child must manipulate the objects very accurately, exploiting hand control developed in the exercises of practical life. In some activity sequences children gradually work up to manipulating and organising large numbers of components independently, for example, by the end of the work with the solid

³¹ In classrooms for children over six years, this tower is re-represented in a different form, the tower of jewels, as the culmination of an exercise with five hundred and fifty coloured bead bars in which children use the commutative law of multiplication to gather together all the terms in a 'decanomial', that is, all the multiplication tables from one to ten. The children also calculate the volume of the cubes after they have learnt the relevant formula. In other words, the sensory 'impression', or contour, left by the pink tower 'fits' future educational knowledge.

cylinders (Illustration 6.8) the child is selecting from, manipulating and organising forty cylinders.³²



Photos: Candy le Guay (1984)

Illustration 6.8: Stage 2 - Independent work with the pink tower and the solid cylinders

The relations of contrast and similarity, and the control of error designed into the sets of graded objects, enable the child to experience two types of independence. First, by repeatedly comparing the relations while manipulating the objects, the child gradually internalises these meanings, developing the ability to decontextualise them, that is, to control them independently of the mediational means, the objects. In semiotic terms, the child learns to abstract the meaning relations built into the set of objects, thus, opening up the potential for their application in different, and even unfamiliar, contexts. Second, the control of error integrates into the objects guidance otherwise provided by the adult. In this way the child is enabled to interact with the objects successfully, yet independently of the adult.

³² There are many variations in the use of the sensorial materials which are never presented to the children; they are left to discover these independently. The teacher observes children's use of the materials to note whether variations relate to an exploration of the quality isolated by the material or not. In the Montessori tradition, if the child uses the material for imaginary play, this indicates a social or emotional need for free play with toys such as plain blocks or for a practical life exercise. Inappropriate use may also be the result of the material being too challenging or not challenging enough. The child is directed to more appropriate materials or exercises, without being made to feel that his or her activity was in any way unsuccessful.

An important part of the teacher's presentation of the exercise of the senses is the teaching of a precise language for describing the sensory qualities of the objects, an 'exact nomenclature' (Montessori 1964 [1909/1912], p.225), emulating the exactness and precision which is characteristic of language used to represent educational knowledge in general. The language is taught using *the three period lesson of Séguin*. This lesson is presented in the following section.

As with all Montessori materials the sensorial materials have direct and indirect purposes. The direct purpose is the conscious development of perceptual discrimination, classification and memory. The indirect purpose is to initiate entry into the meaning systems of educational knowledge, including arithmetic, plane and solid geometry, music, art and science. In the Montessori tradition, the ordering and classifying of perceptual impressions through the exercises of the senses in the first plane of development is the foundation for 'the next plane of development, that is ... logical and reasoned thought'.³³ The link between the exercises of the senses and educational knowledge is language.

6.7.2 The three-period lesson of Séguin

On the basis of her experimental pedagogy Montessori (1964 [1909/1912] p. 177) observed that, if children were to remember the perceptions they become conscious of through the sense exercises, 'it is advisable ... to associate the language with these perceptions'. Giving the child language to classify and grade the attributes of the sensorial materials is the first step towards the higher order use of the powers of 'differential perception' (Montessori 1964 [1909/1912], p. 178). To associate language with perceptions, Montessori again turned to Séguin, this time for a structured lesson designed to associate a sensory perception with a name (noun or adjective), a lesson which has come to be called *the three period lesson*.³⁴ The three period lesson is the language use component of the presentation stage of a sense exercise ensemble (Section 5.7.2). In a practical life exercise, the language use which accompanies the use of the objects is

³³ From the introductory lecture to the sensorial materials by Ms Elizabeth Hall, Sydney Montessori Teachers' College, 'Casa dei Bambini' training course, 1983-1984.

³⁴ Nouns include the names of three- and two-dimensional geometric shapes such as *cube* and *triangle*, or the name of musical notes such as C and A. Adjectives include the names of sensory qualities, for example, *red/blue/yellow*, *long/short*, *rough/smooth*, *thick/thin*, *sweet/sour*, *hot/cold*, *loud/soft*, *heavy/light* and, as in the case of musical notes, *high/low*.

limited to redundant labelling as a means of identifying the salience of an element, or part of an element, in the context of an activity sequence. In a sense exercise, the three period lesson is language use which labels the values in the meaning system materialised by the objects. For example, three period lessons for naming colours accompanies the presentation of the colour tablets.³⁵

The Montessori colour tablets are an exercise of the visual sense. The shape and size of the tablets remain constant, the only variation being the colour. The tablets are stored in three boxes. The work begins with Box 1 when the child is about three years old. This box contains six tablets, one pair of each of the primary colours (red, blue, yellow), in which each pair of tablets represents a value in the system of primary colours, as presented in Figure 6.1.

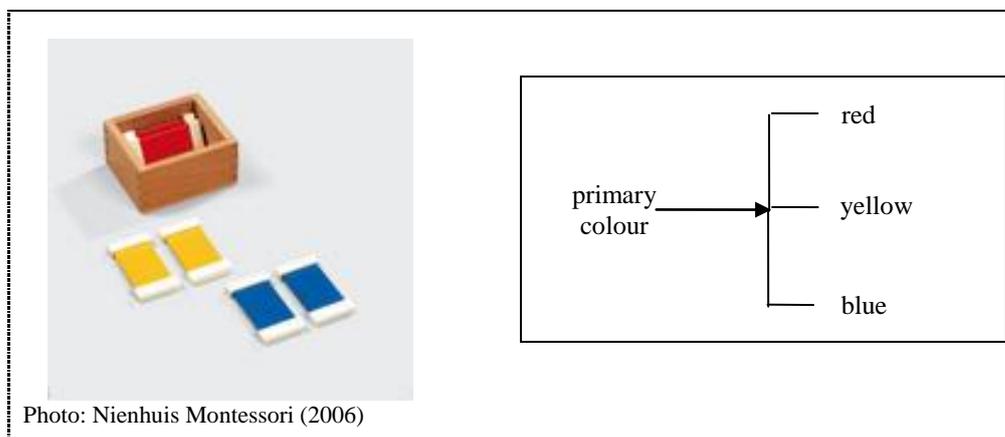


Photo: Nienhuis Montessori (2006)

Figure 6.1: Box 1 colour tablets and the system they materialise

The presentation opens with an activity sequence. The tablets are taken out of the box and mixed up randomly. The teacher selects a tablet, asks the child to find one ‘just like it’ and demonstrates how to arrange the matching tablets as a pair, handing over to the child as soon as possible. At the end of the sequence the tablets are arranged as an array of matching pairs. The matching activity regulates the child's attention, foregrounding colour as the salient attribute of the objects. The final array captures and displays the child's choices as a system, the system of primary colours.

³⁵ In early Montessori classrooms the colour tablets were made by winding embroidery silk onto small wooden tablets. The colour tablets are now commonly bought from the manufacturer who reproduces them in wood painted with glossy enamel. Many Montessorians regret the passing of the silk tablets because they believe that the enamel lacks the aesthetic appeal of the shimmering silk and the motive for concentrated, careful use offered by the delicate threads. This anecdote highlights the importance to Montessorians of delicate levels of detail which they believe contribute to the pedagogical value of the materials.

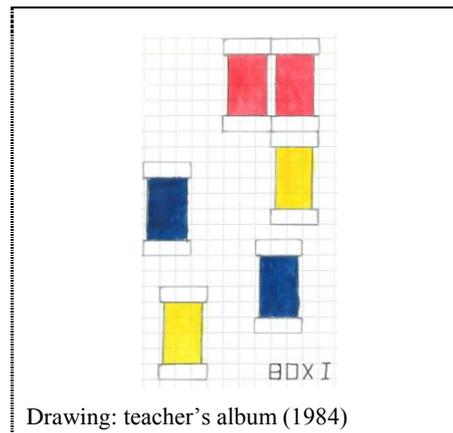


Illustration 6.9: Box 1 colour tablets array in progress

The activity is extended with Box 2, containing eleven pairs of tablets. When organised into an array, the matched pairs materialise and display the systems of secondary colours (orange, green, purple), tertiary colours (pink, grey, brown) and black and white, as presented in Figure 6.2.

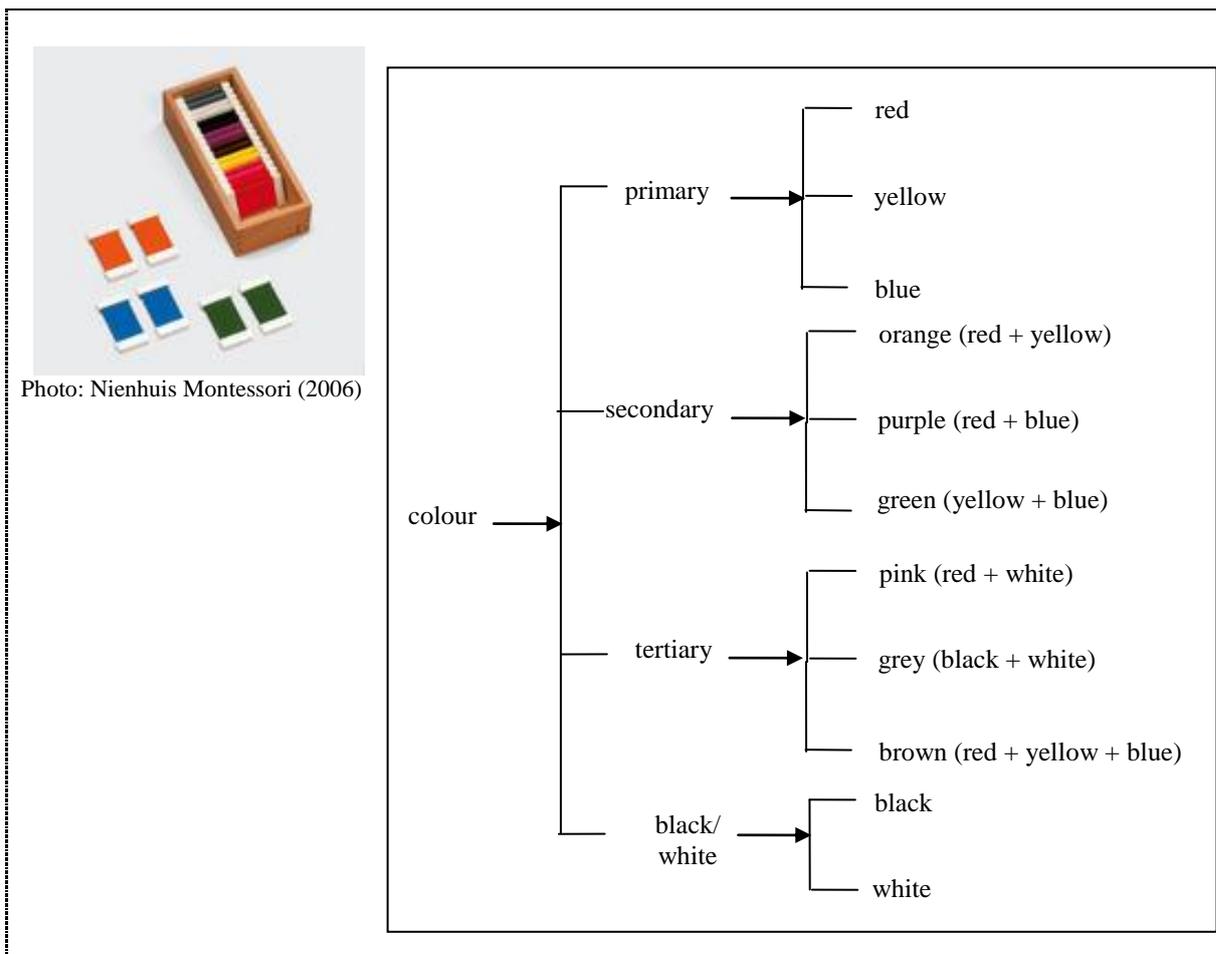


Figure 6.2: Box 2 colour tablets and the system they materialise

The names of the colours in the first two boxes are presented in three period lessons before the child works with Box 3. In the third box, each of the primary, secondary and tertiary colours is presented as a set of seven shades graded from light to dark. The box contains sixty-three tablets in all. A child choosing a colour tablet from Box 3 is selecting from two simultaneous sets of options (colour and the dark-light continuum) to arrange the tablets into seven graded sets, as illustrated in Figure 6.3. Black and white re-appear in this box as the darkest and lightest shades of grey.

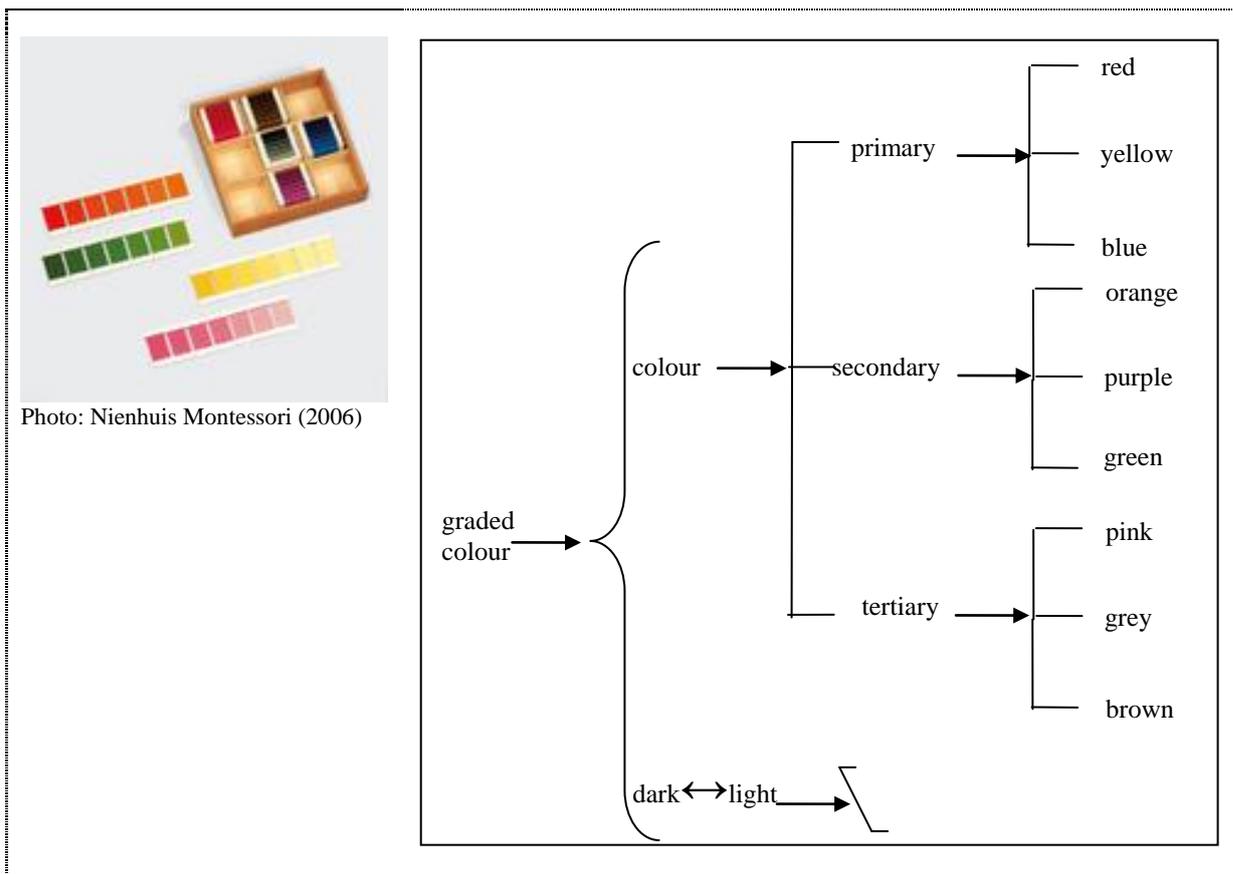


Figure 6.3: Box 3 colour tablets and the system they materialise³⁶

In practice, when children enter the Montessori Casa dei Bambini, they know the names of many of the colours represented by the colour tablets, and the naming lesson confirms this knowledge. The significance of the colour tablets is that they systematise the child's perception of colour (gained informally and unsystematically in everyday life) in a culturally salient way. As the colour tablets ensemble unfolds the whole system is given to the child, revealing the relational location of already familiar colours, and hence their value, and the existence of perhaps not-yet-perceived colour values, in accord with the visual and linguistic systems of the culture.

In her description of the lesson for naming colours, Montessori (1964 [1909/1912], p. 178) writes that Séguin 'advises us never to present [the name of] the colour singly, but always two at a time, since the contrast helps the ... memory'. In contemporary Montessori classrooms this is often extended to three items wherever possible.

³⁶ The slanted bracket as a means of representing grading as an option in a system network is taken from Hood (2006).

The naming lesson is part of the presentation stage of the ensemble. It is presented after the sequence in which the child matches or grades, in collaboration with the teacher, to build the final synoptic array.

The naming lesson has three parts, as reflected in the label ‘the three period lesson of Séguin’. The language used by the teacher in the three parts of the lesson as it applies to the colour tablets is summarised in Table 6.3 below.

First period	<p><i>This is red.</i> <i>This is blue.</i> <i>This is yellow</i></p>
Second period	<p><i>Give me the red (one).</i> <i>Which one is blue?</i> <i>(Can you) show me (which one is) the yellow (one)?</i> <i>Where is the red (one)?</i> <i>Put the blue (one) back in the box.</i> <i>(Can you) find the red one?</i> <i>(Would you like to) find the yellow one?</i></p>
Third period	<p><i>What’s this?</i> <i>Do you remember what this is?</i> <i>Can you tell me what this is?</i></p>

Table 6.3: Teacher language in the three period lesson of Séguin

As the examples in Table 6.3 show, *relational meanings*, realised by the verb *is*, are a central feature of the language used in the three period lesson. Relational meanings are ideational meanings, and play a key role in the construal of educational knowledge in the three period lesson, being arguably the source of the pedagogic force of the lesson used in conjunction with the objects.

In the first period of the lesson, the clause, configured around the relational process *is*, labels the tablet in terms of colour (*This is red.*), attributing it with both a quality (‘red’) and membership of a class (‘red objects’). The quality for the adult has both an external orientation, as a physical attribute, and an internal orientation, as a transportable, abstract concept which can be assigned to any number of objects. The tablet and its quality are linked grammatically in an *attributive relation*, with the tablet (a physically-present object) the Carrier of the quality, as seen in Table 6.4.

Figure		
Element 'physically-present object/ red colour tablet'	Element 'indicating movement'	Element 'quality'
<i>This</i>	<i>is</i>	<i>red.</i>
CARRIER	RELATIONAL PROCESS: ATTRIBUTIVE [describing/classifying]	ATTRIBUTE [abstract/transportable]

Table 6.4: First period: colour tablet assigned a quality

From the child's perspective, however, it is possible that, at this stage, the name *red* refers to, and identifies, the physically-present object, the red tablet, in the way the child might use the word *Red* as a proper name to identify a toy or a pet. This, following Hasan (2005c [1992], p. 81), is using the linguistic sign as a 'signal', an external orientation. A child's use of a colour word in this way, at this point in the lesson, is enough to initiate the process of semiotic mediation. Recast in Vygotsky's terms, the child's meaning *red* at this point is a pseudoconcept, a contour, or shadow, of an abstract, true, concept, enabling the adult and the child to talk about shared experience with mutual understanding.

The relation which links a physically-present object to a proper name is an *identifying relation*; the word representing the object is the Token and the proper name is the Value. The child's experience with the colour tablets, however, has the potential to shift the child's use of this relation. Because the colour tablets have been involved in an activity sequence tying each tablet into an array materialising a symbol system of colour values, this same identifying relational process identifies each colour tablet as a value in the materialised system. In this way, the context-dependent signalling relation becomes a gateway for the child into a context-independent, culturally-salient symbol system of colour values, a shift towards an internal orientation. The identifying relation is conflated with the attributive relation in Table 6.5.

Figure		
Element 'physically-present object/ red colour tablet'	Element 'indicating movement'	Element 'quality/proper name/ location in array'
<i>This</i>	<i>is</i>	<i>red.</i>
CARRIER	RELATIONAL PROCESS: ATTRIBUTIVE [describing/classifying]	ATTRIBUTE [abstract/transportable]
TOKEN	RELATIONAL PROCESS: IDENTIFYING [signalling/symbolising]	VALUE [signal/symbol]

Table 6.5: First period: colour tablet identified by a signal and by a value

The noteworthy feature of Montessori pedagogy is that, wherever the child's use of a meaning such as *red* is located on the developmental pathway from context-dependent signal for a physically present object to abstract, transportable attribute, the system of relational values which gives the abstract meaning its value is also physically present in a synoptic, idealised form, materialised in the array in which the object is located. Thus, the array of colour tablets representing the primary colours renders the values *red*, *blue* and *yellow* as a system of relations. When a child is given a word to signal one value in this materialised system, the child engages with the system's meaning potential and takes a step towards eventually internalising the system as a whole, and with it the abstract values it carries. This ideational engagement is supported by the interpersonal and textual meanings in the clause.

Interpersonally, the clause *This is red* is a **statement**. It gives information and is congruently structured as an indicative clause. At the same time the teacher performs an indicative action (placing the object). Conflating the language and the action initiates an exchange of information in which the teacher is the speaker (and performer) and the child is the listener (and viewer). The pronoun *this* is the Subject of the clause, 'the element the speaker makes responsible for the validity of what he is saying' (Halliday 2004a, p. 59), with the verb *is* as Finite. Together Subject and Finite (the **mood** element of the clause) carry 'the arguability value of the clause' (Matthiessen 1991, p. 79), opening up the potential for the child to respond *Is it?*, although no response is expected in the first period

of the lesson.³⁷ How the interpersonal meanings of the clause conflate with the experiential meanings is represented in Table 6.6.

<i>Type of meaning</i>	MEANING SYSTEM	Figure		
		Element 'colour tablet'	Element 'indicating movement'	Element 'location in array'
		<i>This</i>	<i>is</i>	<i>red.</i>
<i>experiential</i>	TRANSITIVITY	CARRIER	RELATIONAL PROCESS: ATTRIBUTIVE [describing/classifying]	ATTRIBUTE [transportable class]
		TOKEN	RELATIONAL PROCESS: IDENTIFYING [signalling/symbolising]	VALUE [signal/symbol]
<i>interpersonal</i>	MOOD	SUBJECT [responsible for validity]	FINITE INDICATIVE: DECLARATIVE	

Table 6.6: First period: conflation of experiential and interpersonal meanings

Textually, the clause *This is red* is a **message**, 'a quantum of information' (Halliday 2004a, p. 58). The 'ground' of the message, its starting point, is the **theme**, represented by the pronoun *this*, which exophorically references, and orients attention to, the colour tablet. This orientation is re-represented in movement, the pointing to, and/or placing of, the tablet in the centre of the field of shared attention. In the information structure of the clause the pronoun *this* represents the **given** information already present in the physical context ('the tablet'), while the salient property of the object ('red') is the **new** information focus, represented by the word *red*. The information focus is underwritten by the emphasis the word is given in the intonation pattern of the teacher's speech. How textual meanings of the clause conflate with the experiential and interpersonal meanings is represented in Table 6.7.

³⁷ The child might be encouraged to say the colour names so the teacher can check articulation, but no other language is used.

<i>Type of meaning</i>	MEANING SYSTEM	Figure		
		Element 'colour tablet'	Element 'indicating movement'	Element 'location in array'
		<i>This</i>	<i>is</i>	<i>red.</i>
<i>experiential</i>	TRANSITIVITY	CARRIER	RELATIONAL PROCESS: ATTRIBUTIVE [describing/classifying]	ATTRIBUTE [transportable class]
		TOKEN	RELATIONAL PROCESS: IDENTIFYING [signalling/symbolising]	VALUE [signal/symbol]
<i>interpersonal</i>	MOOD	SUBJECT [responsible for validity]	FINITE INDICATIVE: DECLARATIVE	
<i>textual</i>	THEMATIC STRUCTURE	THEME [ground/starting point]		
	INFORMATION STRUCTURE	GIVEN [already present]		NEW [salient property; information focus]

Table 6.7: First period: conflation of experiential, interpersonal and textual meanings

The conflation in a clause of the three lines of meaning, experiential, interpersonal and textual, establishes a 'metafunctional focal point' (Matthiessen 1991, p. 78). Each line of meaning has its own organisational principles and each transforms reality into meaning from a different perspective, yet they all focus on the clause, creating what Halliday calls a 'grammatical gateway' into meaning (Matthiessen 1991, p. 78). The following paragraphs track how the metafunctional organisation of the teacher's language changes as the three period lesson unfolds, in order to reveal how the lesson leads children through a metafunctional 'gateway' towards the types of meanings which encode educational knowledge.

In the *first period* of the lesson, the way the three lines of meaning are integrated in the clause structure, as revealed in Table 6.7, results in a surge in the semiotic load carried by the pronoun *this*. The surge is reinforced because the pronoun ties into the clause, through **exophoric reference**, the object in the teacher and child's shared field of attention (the red colour tablet). This tie is re-represented in movements (indicating gesture and placement). The semiotic surge of integrated lines of meaning at the beginning of the clause realises the semantic feature **indication**. Throughout Montessori instructional discourse, the feature **indication** is deployed, in this way, at the origin of a developmental pathway. In the exercises of practical life **indication** is used to regulate conscious reflection and voluntary control in order to achieve practical goals. In the exercises of the senses **indication** is used to draw attention to salient elements of an ideal form, the materialised

system of meanings, orienting the child towards future internalisation of the system. A second semiotic surge in the clause accompanies the element *red*, the symbol for the salient property of the object, its colour, the new information in this context.³⁸

The *second period* of the lesson is a period of collaboration between the teacher and child. This collaboration is possible because, following the first period, there is an overlap between the full abstract meaning used by the adult and the ‘contour’ of the meaning used by the child; teacher and child are both using the same words to refer to the same physically-present objects. In the second period the child contributes, through action, to the identification of the object. This is the most extended period of the three period lesson, and the one in which, in the Montessori tradition, learning is said to take place. The second period is marked by interaction involving as much variation as possible, in both language and movement. This increase in variation can be interpreted as a further opening of the gateway towards control of the meaning potential carried by the materialised system.

The second period begins when the teacher spreads out all the colour tablets in the set inside the frame of the floor mat or table top. The teacher then initiates the exchange using a linguistic move. The child responds with indication expressed as movement. This response is elicited by the teacher using language such as the following:

Give me the red (one).

Which one is blue?

(Can you) show me (which one) is the yellow (one)?

Where is the red (one)?

Put the blue (one) back in the box.

(Can you) find the red one?

(Would you like to) find the yellow one?

The interaction is constructed by the interpersonal grammar. In contrast to the semantic and grammatical austerity of the first period in which one speech function giving

³⁸ An important aspect of the transition from the exercises of practical life to the exercises of the senses is the changing role of language. In the exercises of practical life activity sequences are accompanied by language. In the exercises of the senses language progressively takes over, activity sequences and final arrays are increasingly directed by the language, and later become an accompaniment to language, before the objects and movements are abandoned altogether and the meanings are internalised. This transition echoes the progression of Vygotsky’s sociogenetic trajectories.

information (**statement**) realises one grammatical structure (an indicative clause), a feature of the second period is a significant increase in semantic, and grammatical, variation. For example, the teacher's moves deploy two types of speech function to initiate an exchange: **questions** to demand information and **commands** to demand action. Furthermore, while some **questions** and **commands** are realised congruently as interrogatives and imperatives respectively, some interrogatives disrupt the typical relation between the grammar of the clause and its semantics, expanding their meaning potential through grammatical metaphor, as illustrated in interrogative clauses used to realise **commands** (*Can you show me the blue one?*).

The child's response to this variety of linguistic moves (demands for information and for action) by the teacher is always action, either pointing to or relocating objects, but action which can be interpreted, because of the objects, as giving information. Thus, in the second period, the semantic function of **indication** is no longer exclusively the teacher's responsibility, as in the first period.

In the teacher's language, during the second period, the location of the word *red* varies along the rank scale. Experientially, it can be a participant (Value/Attribute) in a relational clause (*Which one is red?*) or a Classifier in a nominal group, where the nominal group is the Value in an identifying relational clause (*Which one is the red one?*), a Carrier in an attributive relational clause (*Where is the red one?*) or a Goal in a material clause (*Find the red one.*). Shifting the grammatical rank, and grammatical role, of the word *red* in the second period is a step towards loosening the proper name, or signal, relation between the word and the object, expanding its potential towards a more transportable and abstract use of the meaning.

Textually, in contrast to the interpersonal and experiential variation, the name of the quality in all variations in the second period retains its function as **new** information, which predictably would be confirmed in an analysis of the emphasis in the teacher's speech.

If children make a mistake at any time in the second period, after a pause the teacher returns to the first period, explicitly identifying the quality again, but without explicitly correcting the child.³⁹

Once the child is successful in the second period, the teacher initiates *the third period*, by asking **questions** realised as interrogatives in which the name of the quality is missing: *What's this?, Do you remember what this is? Can you tell me what this is?* These questions are demands for the missing information. Thus, responsibility for identification, for giving information through both action and language, is now completely handed over to the child.

Experientially, in the third period, the teacher's language not only features the identifying relation between the object and its value in its most straightforward realisation *What's this?* This relation is also projected using mental processes, the processes of inner consciousness (*Do you **remember** what this is?*), or verbal processes, the processes of symbolic exchange (*Can you **tell** me what this is?*). Interpersonally these interrogative clauses are examples of grammatical metaphor, incongruently realising **commands**, echoing the interrogative clauses used to realise **commands** in the second period. (*Can you **show** me the blue one?; Can you **find** the red one?*). The developmental move, from the incongruent commands of the second period to those which project the identifying relation in the third period, is captured in the shift from the second period demand for an action as a means for giving information (the identification, through movement, of an object in an array) to the third period demand for information (the identification, through language, of a value in a system). Textually, the projecting clauses of the third period *preface* the teacher's message, which, following Williams (1999a, p. 98), makes 'the subjective experience of the child the focus of the enquiry'.

Projecting clauses such as *Can you show me ...?, Can you tell me ...?* and *Do you remember ...?* are all examples of prefaced interrogatives, clause structures which appear

³⁹ Montessori (1964 [1912], p. 226) explains why in the following way:

If the child has not succeeded in associating the name with the object, the only way in which to succeed would be to repeat both the action of the sense stimuli and the name; in other words, to repeat the lesson. But when the child has failed, we should know that he was not at that instant ready for the psychic association which we wished to provoke in him, and we must therefore choose another moment.

If we should say, in correcting the child, "No, you have made a mistake," all these words, which, being in the form of a reproof, would strike him more forcibly than others [...], would remain in the mind of the child, retarding the learning of the names. On the contrary, the silence which follows the error leaves the field of consciousness clear, and the next lesson may successfully follow the first.

to be crucially implicated in the development of semantic orientations to processing supra-local meanings. This feature has been identified by Hasan (2004, p. 174) as one key characteristic of the discourse of English-speaking mothers who mediate knowledge explicitly for their children in everyday contexts. Hasan argues that mothers who use language such as this tend to provide their children with 'sustained explicit information in emotionally supportive environments', in the process developing 'an orientation to decontextualised knowledge', the knowledge of course most valued in educational contexts. Thus, the language of the three period lesson appears to recontextualise, as institutional pedagogic discourse, critical aspects of the informal, everyday language of mothers whose language seems to facilitate children's early pedagogic success in school. The three period lesson introduces this discursive orientation in incremental steps, from the representation of concrete physically-present objects to symbolic representation.

The semantic feature [**prefaced**], as Hasan (2004) has demonstrated, both semantically and through detailed empirical research, is an indexical feature of the everyday talk of mothers from social groups with higher levels of social and cultural autonomy. It is a discursive practice which represents an 'invisible semiotic mediation' through which children from these social groups achieve a mental disposition orienting them favourably to school education. More specifically, in related work, the extensive use of the mental process *remember* in the prefacing of questions by mothers from higher autonomy social groups asking about their children's memories of real and storybook events has been linked by Williams (2005b) both to the central role of memory in a young child's thinking, as identified by Vygotsky (1978, p. 50), and to the ontogenesis of the discourse of educational knowledge, described by Bernstein (2000) as *vertical discourse*. This type of semiotic mediation appears not to be experienced so frequently in everyday contexts by children from social groups with lower levels of social and cultural autonomy. The three period lesson, however, makes this practice available to all children in an accessible form in a well-defined context. Combined with the use of the Montessori objects, the three period lesson appears to recontextualise this educationally-enabling discursive practice as visible pedagogy, and, therefore, may represent an approach with the potential to redistribute more equitably across different social groups a favourable orientation to the decontextualised knowledge which is a feature of school education.

In summary, at the end of the three period lesson, and at the end of the first stage of the ensemble, the child has a small system of linguistic signs to use while working independently with the objects during the second stage of the ensemble. The second stage of the ensemble includes a variety of *memory games*. Memory games with the first and second boxes of the colour tablets include placing one of each pair on a framed space (table or mat) and the others at a distance. The child chooses a colour, looks at it, leaves it on the table, then, holding onto the mental image, fetches the matching tablet from the distant table. Children play a similar memory game with the graded tablets.⁴⁰

In the *third, or extension, stage* of the ensemble, children match the tablets to objects in the room, or they begin to work with colour values independently of the tablets, for example, in visual art. To be successful at this stage, the child must have ceased using the colour names as signals identifying specific objects (the colour tablets), but instead must have transformed the colour names into generalised, symbolically transportable meanings. In the third stage of the colour tablets ensemble, following extended engagement with the system materialised by the objects, a child who says *My shoes are brown* is no longer merely describing the shoes, but is consciously categorising his or her shoes as an instance of the general class of brown things, where *brown* is a relative value in an abstract system of attributes. Grammatically the nominal group *my shoes* is a Carrier of the Attribute *brown*.

⁴⁰ Similarly, in all sense exercises, just before the child's interest wanes, and if the child has not discovered it by themselves by observing other children, the teacher introduces the next level of difficulty and more refined level of discrimination. As the finest levels of discrimination are reached, the teacher introduces the memory games. In these games the child needs to hold the 'image' of the sensory quality in their mind. For example, in the memory game with the Montessori bells the child may carry one set of identical bells graded in pitch to the intervals of the major scale to one side of the room and a matching set to the other side. The child mixes up the first set of bells, strikes one, walks across the room and searches for the bell with the matching pitch among the other set of bells.

Figure		
Element 'objects'	Element 'indicating movement'	Element 'property of objects'
<i>My shoes</i>	<i>are</i>	<i>brown.</i>
CARRIER	RELATIONAL PROCESS: ATTRIBUTIVE [describing/classifying]	ATTRIBUTE [transportable/class]

Table 6.8: Third stage of the ensemble: experiential meaning⁴¹

The colour tablets are presented to children from age two and a half to three and a half. This matches the age range in which the subject of Painter's (1999, p. 100) case study developed the use of relational clauses, from clauses in which one participant role always included an exophoric reference to physically present phenomena, to utterances in which the child reflected on categories while observing and talking about physically present instances. To understand the impact of the exercises of the senses in general, and the three period lesson in particular, on the expansion of meaning potential at this age would require collecting and analysing relevant linguistic data in Montessori classrooms, parallel to the way Painter collected data in everyday contexts. It is possible to suggest, however, that the language used in three period lessons in conjunction with the use of the Montessori objects, has features which potentially orient children towards generalised knowledge and, ultimately, abstract decontextualised knowledge.⁴²

The work with the colour tablets systematises and decontextualises the everyday sensory experience of colour. The next section briefly tracks one of many Montessori instructional pathways along which educational knowledge is first presented in the form of a materialised system and then incrementally decontextualised. This pathway has its origins in the geometry cabinet, and associated exercises of the visual sense presented in the

⁴¹ To facilitate the third stage of an ensemble, the teacher brings into the classroom objects which exhibit the properties isolated in the sensorial materials. For example, the teacher might wear clothing in fabrics with distinctly rough and smooth textures, in contrasting colours or graded shades. The teacher might place in the room furniture or objects, for example a mirror, table, vase or clock in geometric shapes or play music or sing songs with contrasting or graded pitch in the melody. The teacher never explicitly makes the connections between the qualities isolated in the exercises of the senses and artefacts in the environment. The children are left to make these connections by themselves. Similarly, the teacher observes, but never directs, the child's drawing, painting or use of clay, noting how the child applies their knowledge of sensory properties. 'Such designs are precious guides ... for the teacher in the matter of her intervention' (Montessori 1964 [1909/1912], p. 242).

⁴² The three period lesson is a tool Montessori teachers apply widely as a way of evaluating development. Teachers graduating from Montessori training courses are often told that they have only completed the second period of their training; the third period commences once they start teaching children. Montessori teachers' everyday talk about children's general development is often couched in terms of the three periods. A child in the first period needs more teaching; a child in the second period needs more independent work and a child in the third period is ready to progress to the next phase of the curriculum.

Children's House. It then progresses to the use of the geometry sticks, objects presented during the school years to children aged from six to nine.

6.8 Decontextualising educational knowledge

6.8.1 The geometry cabinet

The provenance of the Montessori *geometry cabinet* has its origin in the use Itard made of geometric shapes to train Victor's memory and to prepare him for reading (Section 3.6). Montessori (1964 [1909/1912], p. 195) expanded Séguin's elaboration of this idea into 'plane geometric insets of wood', stored in a cabinet. The plane geometric insets contrast with the *geometry solids*, another exercise of the senses. The contrast with the geometry solids emphasises that although the plane insets of the geometry cabinet are, in reality, three-dimensional, they represent two-dimensional shapes, as seen in Illustration 6.10.

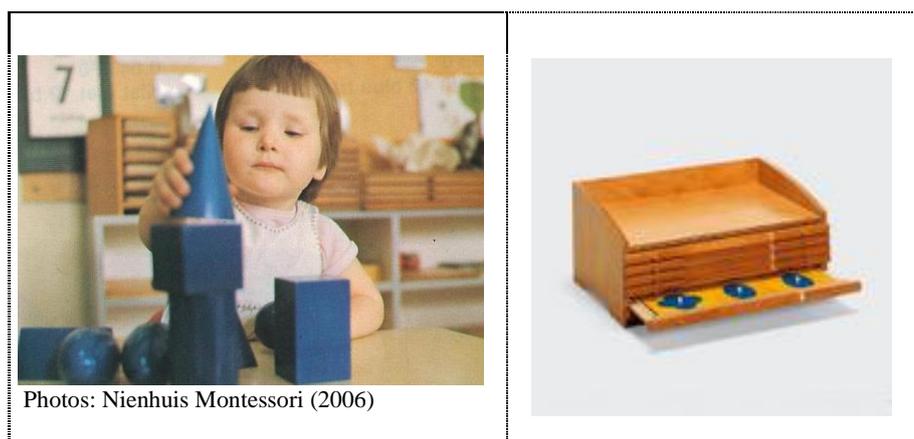


Illustration 6.10: The geometry solids and the geometry cabinet

The design feature common to all objects used in the sense exercises applies to the geometry cabinet, that is, all properties of the plane insets and their frames, except the focus of the exercise, remain constant; so the material (wood), colour (blue inset and yellow frame) and texture (smooth) are kept constant, while the two-dimensional surface of each shape varies.

A presentation tray is placed on top of the geometry cabinet. In this tray are stored the three most contrasting shapes, the basic figures of geometry, (equilateral) triangle, square and circle. Knowledge of this index system of shapes is essential to understanding

geometry as an educational discipline, in the same way as the system of primary colours is the foundation for understanding colour values.⁴³

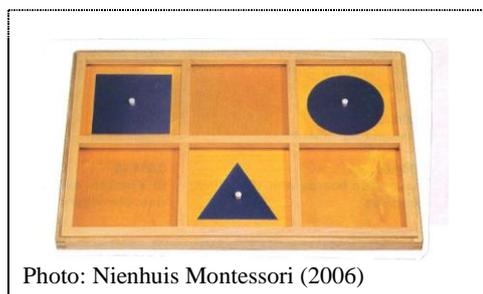


Photo: Nienhuis Montessori (2006)

Illustration 6.11: The geometry cabinet presentation tray

There are five drawers in the cabinet, each containing wooden frames and insets representing plane geometric shapes. There are over thirty shapes organised taxonomically in the cabinet; including, for example, different types of triangles, different sizes of circles, different types of polygons and the square as the limit of a series of rectangles. The shapes are presented to the children systematically, ‘from contrasted frames to analogous ones’ (Montessori 1964 [1909/1912], p. 198). In the Casa dei Bambini the cabinet is presented to children in the age range from three to five years.

The plane insets are presented to children in activity sequences in which three, or more, insets are removed from the frames and the outlines of each inset and its frame are traced before replacing the inset in the frame. The tracing makes concrete a function known in the Montessori tradition as the ‘polarisation of attention’, the type of attention required if a child is to compare the two forms. The frame acts as a mechanical control of error, allowing the child to self-correct which Montessori (1964 [1909/1912], p. 171) writes, ‘leads the child to concentrate his attention upon the differences ... and to compare the various pieces’.

The interactivity of the sequence is realised by **commands** built into the material, the knobs on the insets, demanding to be grasped, and the empty frames, demanding to be filled.

⁴³ In the Montessori tradition the triangle (the polygon with the smallest number of sides) is called The Constructor because it is the building block for all other polygons; the square is called The Measurer because it is used to measure area, and is the face of the cube used to measure volume; and the circle is called The Calculator because it calculates angles. In the series of geometric shapes limited by the triangle (three sides) and the circle (infinite number of sides) lie all the polygons.

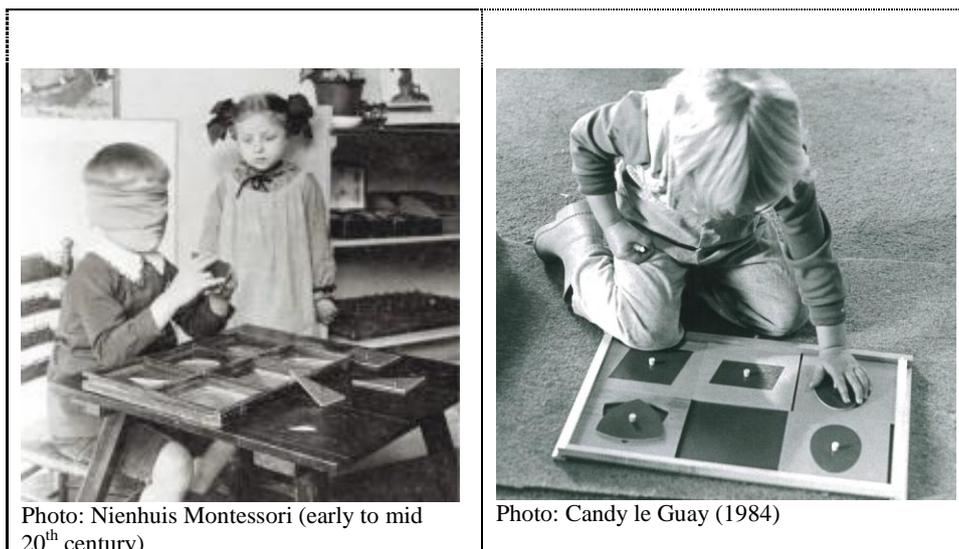


Illustration 6.12: Independent work with the geometry cabinet

As with other exercises of the senses, repeatedly manipulating the plane insets in an interactive activity sequence, and arranging them in a final array, focuses children's attention on the relations between the shapes and their 'value' in a materialised system. The direct aim of the work is a 'generalisation of ideas' with the child recognising the shapes in the environment (Montessori 1964 [1909/1912], p. 227).⁴⁴ The indirect aim is the future use of these shapes in the study of geometry.

Children's manipulation of the shapes is aligned with *three-period lessons* in which the shapes are given names. As with the colour tablets, the naming lesson interweaves two types of relations between the objects and the names. The type of language used in the three parts of the lesson as it applies to shapes in the geometry cabinet is summarised in Table 6.9 below.

⁴⁴ Montessori (1964 [1909/1912], p. 239) describes how the child will 'see the plane geometric forms perfectly represented in windows and doors, and in the faces of many solid objects in use at home'. She continues:

Thus the knowledge of the forms given him in the plane geometric insets will be for him a species of magic *key*, opening the external world, and making him feel that he knows its secrets.

From this passage the sensorial apparatus are sometimes called the 'keys to culture'.

First period	<i>This is a triangle.</i> <i>This is a square.</i> <i>This is a circle.</i>
Second period	<i>Give me the triangle.</i> <i>Which one is the circle?</i> <i>(Can you) show me (which one is) the square?</i> <i>Where is the triangle?</i> <i>Put the circle back in the frame.</i> <i>(Can you) find the square?</i> <i>(Would you like to) find the triangle?</i>
Third period	<i>What's this?</i> <i>Do you remember what this is?</i> <i>Can you tell me what this is?</i>

Table 6.9: Teacher language in a geometry cabinet three period lesson

In the first period of the lesson, the teacher names each shape, for example: *This is a triangle*. In this example, the name *triangle* is a common name for a class of shapes. Using a common name for a whole category of experience (for example, *a cat/cats*), instead of a proper name for one specific instance of the category (for example, *Fluffy*), is described by Halliday (1993b, p. 111) as grammatical generalisation, the key to children's entry into language (See 6.3.2 above). Once a child begins to use common names, vocabulary expands rapidly. In Painter's (1999, p. 84) study 'trying out and learning names as a means of interpreting things' was a feature of the child's everyday talk from two and a half to three years, the age children enter the Casa dei Bambini. At this age the child in Painter's study habitually used exophoric reference to recover what was being named from the context of situation and to bring it into 'the semiotic context'.

In the Casa dei Bambini young children's interest in naming as a means of interpretation is exploited during the exercises of the senses in order to build a lexical foundation for future abstract discipline knowledge. Being able to manage grammatical abstractness is identified by Halliday (1993b, p. 111) as the key to children's entry into literacy and 'primary educational knowledge'. The materialisation of abstractions in the plane insets not only gives young children early sensory access to abstractions (concrete signs), but

also gives them, by means of exophoric reference to a physically-present object, semiotic access to the names (linguistic signs) which represent the abstractions.

The origin of a Montessori developmental pathway towards abstraction is marked by the semantic feature **indication**. In the example *This is a triangle*, in which the reference element *this* functions both as Carrier and Theme in an attributive clause, the semantics of **indication** brings the object, and its meaning, into the child's semiotic context through the familiar use of exophoric reference. The naming element *a triangle* is a common name, a grammatical item used by young children in their everyday language, but it is also a foundation abstract category of the mathematical discipline of geometry. In this sense it has a double meaning. The meaning within the child's grasp, the common name, functions as a contour, or pseudoconcept, onto which the future abstract meaning can be overlaid.

Figure		
Element 'physically-present object/ plane inset'	Element 'indicating movement'	Element 'shape'
<i>This</i>	<i>is</i>	<i>a triangle.</i>
CARRIER [exophoric reference item]	RELATIONAL PROCESS: ATTRIBUTIVE [1. naming/ 2.classifying]	ATTRIBUTE [1. common name/ 2. abstract category]

Table 6.10: First period: plane inset given a common name

The second period of the lesson, as seen with the colour tablets, introduces grammatical variety. This includes the teacher using clauses in which the naming element identifies an inset (*Which one is the circle?*), the article now definite, rather than indefinite, to elicit a movement from the child which represents the meaning *This one is the circle*. The use of an identifying relational clause also has a double meaning. The name *the circle* can be a signal for a particular inset, as verified by the child's non-verbal response. In addition, the name *the circle* identifies the inset as a particular value in a system of geometric shapes, a system materialised in an array of plane insets.

Figure		
Element 'physically-present object/ plane inset'	Element 'indicating movement'	Element 'shape'
<i>Which one</i>	<i>is</i>	<i>the circle?</i>
TOKEN [exophoric reference item]	RELATIONAL PROCESS: IDENTIFYING [1. signalling/ 2.symbolising]	VALUE [1. signal/ 2. symbol]

Table 6.11: Second period: name as a signal for an inset

In the third period the child is able to use the names of the plane insets to represent classes of shapes, and to classify objects experienced in the environment in terms of these shapes, for example: *The clockface is a circle; The cloth is a square.*

Figure		
Element	Element	Element
<i>The clockface</i>	<i>is</i>	<i>a circle.</i>
CARRIER	RELATIONAL PROCESS: ATTRIBUTIVE	ATTRIBUTE

Table 6.12: Third period: name as class of shapes

In summary, in the first two periods of the three period lesson, the child experiences the name of each shape variously as a common name and as a signal. This experience is the origin of a developmental pathway towards the later use of the sign, first, as a category for classifying shapes in the environment and, later, as an abstract value in a system of mathematical meanings, the decontextualisation pathway from pseudoconcept to scientific concept in Vygotsky's terms. This pathway is opened up because Montessori objects, such as the plane insets, materialise the general meanings of educational knowledge as concrete signs, enabling children's first experience of these meanings to be simultaneously sensory and semiotic, laying the foundation for wholly semiotic later use. In the case of the plane insets Montessori (1964 [1909/1912], p. 114) describes the distance covered by the pathway as the distance 'between the form of an object and the mathematics of the form'. She believed teachers too often confuse children with 'elaborate explanations' in an attempt to bridge this distance. Instead Montessori pedagogy fills in this distance with interim steps comprising independent activity with objects. These steps, in the case of the geometry cabinet, include memory games and games with geometry cards.

The children play a wide variety of memory games with the geometry cabinet, similar to those played with the colour tablets. Introduced progressively into these games are three series of geometry cards, as seen in Illustration 6.13.

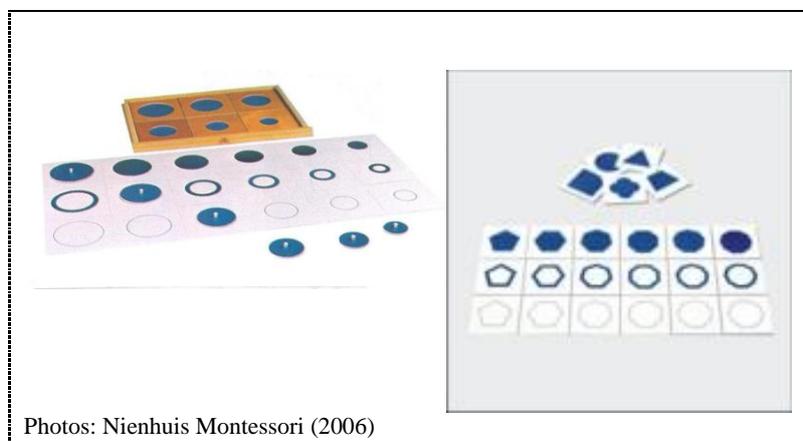


Illustration 6.13: The cards of the geometry cabinet

The first series of cards are exact filled-in images of each of the plane insets. The children match the insets to the cards instead of to the wooden frame, tracing the shapes as before. The matching games continue with a second and a third series of cards on which the shapes are represented as lines, thick lines in the second series and thin lines in the third. The thick lines on the second series are described by Montessori (1964 [1909/1912], p. 200; emphasis in the original) as representing ‘*the path which [the child] has so often followed with his index finger; this line is the trace of a movement*’ used with the solid objects. She continues that in the third series, the child ‘has actually passed to the *line*; that is, to an abstraction, yet here, too, there is the idea of the result of a movement ... the trace left by a pencil’. In this way ‘[t]hese geometric figures in simple outline *have grown out of a gradual series of representations which were concrete to vision and touch*’.⁴⁵

The geometry cabinet continues to be used when children make the transition to school from the age of six. Instead of tracing the shapes, school-age children learn the derivation of the names of the shapes from Latin and Greek words. They are also explicitly taught the shapes in classified sets, for example, the index shapes (triangle, square, circle), triangles classified by sides, triangles classified by angles, quadrilaterals and regular

⁴⁵ Montessori (1964 [1909/1912], pp. 361-362) links work with the geometry cabinet to the development of literacy in the following way:

Now it is precisely by means of guiding and developing the natural instinct “to take hold of everything,” and to recognise the relations of geometrical figures, that we prepare our little four-year-old men for the joy and triumph they experience later over the phenomenon of spontaneous writing.

polygons (the circle, with an infinite number of sides, being the limit of the regular polygons).

It is interesting to compare the Montessori instructional pathway (concrete experience of a meaning to abstract use of the meaning) with the approach used by a non-Montessori teacher to introduce comparable educational knowledge. Such an approach is exemplified in the transcript of a lesson analysed by Butt (1989, pp. 92-95). The object of this lesson, presented to a class of five year olds, is to teach the terms *triangle*, *circle*, *square* and *oblong*.

The teacher begins by eliciting knowledge from the children, which, in Montessori terms, is the third period. The teacher holds up a rubber shape and asks *What's that shape?* Predictably, because there has been no prior teaching, some of the children provide the correct name and some do not. The teacher continues asking for names of a variety of shapes, without clarifying the motivation for the variation (*big circle*, *little circle*, *triangle*). Again, without prior teaching, some children know how to respond and some do not. Without signalling a shift in orientation from naming to defining, the teacher asks for defining features of the shapes (*How many sides does a triangle have?*). When the children are subsequently asked whether there is another shape with three sides, one child responds by indicating another rubber triangle shape, revealing he is still at the stage of using the item *triangle* to label material instances rather than a semiotic category. The shift from material to semiotic use of the term *triangle* seems to have happened too quickly for him to adjust his meaning system in time.

When a child correctly supplies the name *rectangle*, this is rejected by the teacher in favour of the more everyday term *oblong*. With this move the teacher appears to be recognising the complementarity of everyday and specialised meanings in building educational knowledge. In a Montessori classroom, however, the children use specialised terms from the beginning; the everyday-specialised complementarity is structured into the multimodal figures of the activity sequence and the final array, and into the linguistic grammar of the three period lesson, rather than as a function of lexis alone. Another complementarity between the everyday and the specialised in this lesson is the link the teacher makes between the circle the children are sitting in and the circle shapes, which Butt (1989, p. 96) describes in terms of 'giving a word or meaning a number of orientations'. In contrast, in the Montessori ensemble, the use of multiple orientations and

representations is much more systematic and structured. Overall, from a Montessori perspective, the non-Montessori lesson seems a little confusing, because the information and language is presented to the children in an unsystematic and incomplete way. Furthermore, there are no means for determining individual children's understanding at the end of the lesson.

A development in the spoken language of the child studied by Painter (1999), from about the age of three and a half, is the emergence of the use of identifying relational clauses to provide definitions. The use of definitions enters the Montessori curriculum as children begin to learn to read around the age of four. The first definitions relate to observable features of nature, for example, definitions of land and water forms such as an island and a lake.⁴⁶ Although children work extensively with geometry shapes in the Casa dei Bambini, the features which define the shapes, however, are not introduced until the school years, after the age of six. Then, the distance between identifying the forms of geometric shapes and learning their defining features is bridged during activities with the *geometry sticks*. These activities are described briefly in the next section.

6.8.2 The geometry sticks and the passage to abstraction

The exercises for three to six year olds with the geometry cabinet do not teach geometry, Montessori (1964 [1909/1912], p. 236) writes, but rather teach children to observe geometric 'forms' or shapes.

To *observe* a geometric form is not to *analyse* it, and in the analysis geometry begins. ...
The insets which we present simply call the attention to a given form.

While observation of geometric shapes is a feature of the Casa dei Bambini, analysis of geometric shapes complements the study of mathematics in the Montessori curriculum for

⁴⁶ Once children can decode individual words, between the ages of four and five, children are given labels for all aspects of the Montessori environment, including for example, labels for the objects in practical life exercises and the qualities embodied in the sensorial exercises. Children also take part in language extension activities, which are introductory activities in which children learn language to talk about areas of educational knowledge, including botany and geography. These activities include, first, spoken language, and later, writing and reading activities. Geography begins with pouring activities using moulds shaped like land and water forms. These activities progress into activities in which children learn definitions for these forms, for example, *An island is land surrounded by water.* and *A lake is water surrounded by land.* These definitions are matched to models, pictures and labels, and cut into parts to be mixed up, read and re-ordered. In these activities children use small teacher-made booklets as a control of error.

school age children from six to nine years. This work is introduced using concrete, manipulable objects called the *geometry sticks*.



Photos: Nienhuis Montessori (2006)

Illustration 6.14: The geometry sticks

The geometry sticks, also called the box of sticks, are used to construct geometric shapes and to explore geometric relations. This material incrementally continues the process of decontextualisation, a process with its origin in the teacher's use of indication to name the plane insets of the geometry cabinet, the geometry cabinet memory games and the games with the geometry cards. The box of sticks contains colour-coded sticks, calibrated in units from one to ten. Using these sticks, and other objects in the box, the children construct different types of lines, angles, polygons and closed curves, and analyse their parts. Children take several years to complete all the exercises.

The exercises with the sticks are used to teach knowledge about geometry as well as generalised skills in problem-solving, reasoning, classification and set theory. These exercises constitute a passage to abstraction, a pathway along which children make the transition from working with concrete objects to working with concepts 'liberated from matter and objects'⁴⁷. Children reach a point where the objects become a hindrance, and they find it easier to do the work without them. At this point, Montessori (1993 [1915], p. 163) writes:

It is necessary that the child's attention should not be detained on these objects when the delicate phenomenon of abstraction begins.

⁴⁷ From a lecture by Mr Camillo Grazzini, Director, Fondazione 'Centro internazionale di studi Montessoriani', Bergamo, Italy, Montessori Elementary Diploma course, 1984-85.

With the geometry sticks children construct for themselves concrete objects which recontextualise knowledge about the mathematical discipline of geometry; in other words, the sticks are designed to enable children to construct their own critical abstractions. The principles of construction embodied in the activity sequences are transformed into definitions and formulae. The exercises with the geometry sticks, nevertheless, maintain the pattern established by the exercises of practical life and the senses. Dynamic activity sequences in which children use the sticks to construct geometric figures culminate in synoptic final arrays of labelled objects which reveal the value of the objects in the meaning systems of geometry. As a final step into abstraction, the activity sequences that construct the objects being studied are decontextualised into definitions and formulae, which are added to the final arrays.

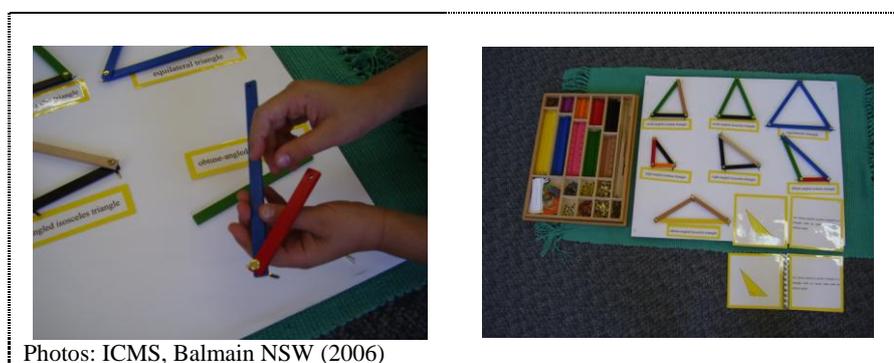


Illustration 6.15: Constructing figures with the geometry sticks and a final array
(the seven triangles of reality) with labels and definition booklets

In summary, the Montessori study of geometry, from the folding cloths, via the plane insets to the geometry sticks, uses the multimodal resources of Montessori ensembles to put into a developmental relation, *logical sequences*, *descriptive taxonomies* and *definitions*, the types of semantic patterning which realise fields of knowledge in the sciences (Halliday 1998). Through the interplay of dynamic concrete experience and synoptic abstract reflection, Montessori pedagogy **recontextualises** the field of geometry accurately for young learners on the basis of its defining semantic relations (Lemke 1990), or register. **Interaction** with logical sequences, taxonomies and definitions, **represented multimodally**, is a feature of all the instructional pathways that comprise Montessori pedagogy. The logical reasoning, taxonomies and definitions of each field of study are mediated through children's use of redundant representations of these semantic patterns in concrete form and corresponding language use (spoken labels, written manipulable labels and, later, written definitions). In this way, children build up, step by microgenetic step,

the ‘ecology of semantic relationships’ of that field, a term used by Mohan and Slater (2005, p. 154) which resonates powerfully with the Montessori tradition.

6.9 Conclusion

This chapter began by presenting the developmental stages which, following Bernstein, bring Montessori pedagogy into relation with a child’s age and context, in other words, transforming Montessori discourse into practice. The remainder of the chapter has reviewed the two foundation areas of Montessori practice: the exercises of practical life and the exercises of the senses.

The exercises of practical life integrate sets of functionally-related objects into purposeful activity sequences. During these exercises, objects and actions of the material domain are placed in stable relations of meaning within a purposeful whole. The exercises of the senses materialise qualities of the material domain as systems of meaning relations, enabling children to experience, through their senses, material qualities as values in a system at the same time as they are given lexical items for labelling these qualities.

The ensembles of dynamic activity sequences using objects and synoptic final arrays of the objects through which Montessori pedagogy recontextualises educational knowledge creates an environment of semiotic redundancy, a redundancy which can be viewed along at least two axes: a dynamic-synoptic axis and a concrete-abstract axis. The dynamic-synoptic axis reveals a redundancy, or complementarity, between everyday activity and educational knowledge, a redundancy which extends both to the regulative and instructional aspects of Montessori pedagogic discourse. The concrete-abstract axis reveals a redundancy between objects representing the meaning systems of educational knowledge and the language used to represent the same meanings. In contrast to the child’s everyday domestic environment, in which objects and movement are used informally and much less systematically, the Montessori environment can be described as meta-semiotic. In the Montessori environment objects and movement systematically construct and represent the meaning systems which bring into existence abstract educational knowledge.

The next chapter explores how the dynamic-synoptic and concrete-abstract axes of redundancy are applied in Montessori pedagogy to recontextualise knowledge about language, specifically, the study of grammar, in the service of the teaching of reading.