Chapter 5: Mapping meaning across multiple dimensions: further steps towards a meta-analytic framework

5.1 Introduction

The previous chapter presented Vygotsky’s genetic model of development and learning as an analytic tool for analysing the Montessori objects and their use. From the perspective of Vygotsky’s framework the Montessori objects can be conceived of as mediational means, which spark microgenetic turning points in the development of educational knowledge. However, Vygotsky’s model on its own lacks a unit of analysis which might enable a fine-grained analytic appraisal, capable of capturing the ways in which objects (physical tools) and signs (psychological tools) are conflated in Montessori pedagogy.

The design of the Montessori objects draws on multiple, potentially meaning-bearing, variables, including colour, shape, texture and size. While these objects, and their multimodal components, function as elements in external activity, they are also designed to be ‘materialised abstractions’ (Montessori 1982 [1949], p. 162), or representations of abstract, cultural meanings, functioning simultaneously as internally-oriented signs. In addition, the objects combine with the meaning potential of two more modalities: movement (external action), and the internally-oriented sign system of language. Through these multimodal combinations Montessori could be said to have designed complexes of signs with both external and internal orientations.

The task of this chapter is to develop a means for analysing the Montessori multimodal complexes of signs, specifically, an analytic means to illuminate the meaning relations between the elements, as well as the external and internal orientations of these meanings. This chapter will argue that analytic tools from the field of social semiotics have the descriptive power to achieve this task. In order to gather the web of meaning relations which make up Montessori complexes of signs, or ensembles, a unit of analysis is needed. The unit selected, following Hasan (2005a, p. 14), is the text, the largest unit of meaning in the social semiotic analytic framework.
This framework is elaborated along multiple dimensions, before being used to describe the structure of the Montessori ensemble.

Semiotic mediation, as argued by Hasan (2005c, pp. 150-155), is implicated in the way the social context shapes the consciousness of the developing child. An important aspect of this process is the recontextualisation of educational knowledge as pedagogy. Following Hasan, I will argue that the concept of the pedagogic device, as proposed by Bernstein (2000), is the most effective means for addressing this issue.

5.2 An ensemble of developmental resources

The term *ensemble* was first used by Séguiin (1971 [1866], p. 291) to describe the sets of educational resources which became the prototypes of the Montessori objects. A century and a half later, Butt (2004, pp. 227-228) uses this term, from a social semiotic perspective, to describe the semiotic resources teachers use to help students move from ‘local action towards human culture in general’, the same move Montessori objects are designed to achieve (as introduced in Chapter 4). The interplay of the material, the semiotic and the cultural in these two uses of the term *ensemble* unite the provenance and purpose of the Montessori objects with the social semiotic perspective of this study.

A key element of the ensembles described by Butt (2004, p. 231) is the deliberate representation of concepts in a form which captures students’ attention. He identifies this type of representation as a *critical abstraction*, which can be ‘recontextualised in a number of intellectual contexts and still retain its degree of fit’. In Butt’s account a critical abstraction represented verbally is typically a definition, but, when more than one mode is used, as in Montessori ensembles, the representation gains depth and power. Furthermore, ‘cross-calibration’ of multiple modes of representation increases the potential for insight (Butt 2004, p. 233).

The ‘semantic core’ of pedagogic discourse incorporating critical abstractions is described by Butt (2004, p. 236) as a two-way process which naturalises abstract concepts in the form of recognisable ‘local knowledge’ (an external orientation) and at the same time denaturalises commonsense knowledge to reveal ‘the conventional
arrangements which underpin our intellectual tools’ (an internal orientation). Semiotic modes available to teachers, as they construct mediational means, to achieve transitions of this type include ‘verbal, iconic, numeric, indexical, kinaesthetic, geometric and musical’ (Butt 2004, p. 231). All these modes are used in Montessori ensembles but, to fine-tune the analysis, meaning-making in Montessori ensembles will be described in terms of two sub-units. The first sub-unit comprises the objects (material/iconic) and the movement (kinaesthetic) which constitutes their use as mediating learning materials. The second sub-unit comprises the discourse (verbal), initiated by the teacher, which accompanies the use of the objects. The task of this chapter is to propose an analytic framework for describing the relations between these two sub-units, as well as the ‘internal’ and ‘external’ relations into which both enter.

Montessori’s training as a scientist seems to have been implicated in the distinctive way she came to interweave these two sub-units of meaning-making. This suggestion is supported by the following description, from Lemke (1998, p. 88), of the multimodal discourse of scientists:

When scientists think, talk, write, work and teach ... they do not just use words; they gesture and move in imaginary visual spaces defined by graphical representations and simulations, which in turn have mathematical expressions that can also be integrated in speech. When scientists communicate in print ... they combine, interconnect, and integrate verbal text with mathematical expressions, quantitative graphs, information tables, abstract diagrams, maps, drawings, photographs and a host of unique specialised visual genres seen nowhere else.

Each mode of the multimodal discourse of science is a separate ‘channel’ of communication (Lemke 1998, pp. 94-95). When the discourse is recontextualised as pedagogy, sometimes equivalent or complementary meanings are made by using different channels simultaneously, or by using first one channel and then another. All the meanings produced through this ‘intersection of different semiotic systems’, however, are ‘joint meanings’ with ‘an underlying unity’. The unity achieved through the intersection of meanings along simultaneous and successive multimodal ‘channels of communication’ in the Montessori ensemble is accounted for in this study by conceiving of the ensemble as a single unit of analysis.
5.3 The evolution of a unit of analysis to accord with Vygotsky’s framework

5.3.1 Word meaning and speech function

Developmental activity is modelled by Vygotsky as a compound of practical action and speech. In this section the evolution of two analytic constructs in Vygotsky’s theory (Minick 2005 [1987]) is used to support the selection of the semantic unit of text as a means for analysing the Montessori ensemble as a complex of signs mediating educational meanings.

Initially, Vygotsky modelled activity as a variation of the stimulus-response unit with signs, originating in social interaction, used as tools to mediate and regulate behaviour and to transform natural functions into higher mental functions under voluntary control, in the process integrating consciousness and behaviour into one system (Minick 2005 [1987], pp. 33-39). This model was then expanded to account for the way signs reorganise natural functions into new interrelated systems of higher mental functions. At this point Vygotsky began ‘to incorporate his knowledge of semiotics and communication more fully into his analysis’ by considering the development of children’s concepts in terms of word meaning (Minick 2005 [1987], p. 41; Vygotsky 1986 [1934]).

Finally Vygotsky began to model concept development in terms of different speech functions, from their origin in social interaction to their role in decontextualised thinking. This is exemplified in Vygotsky’s description of the developmental pathway which transforms the function of indication (signals) into the function of signification (symbols). Indicative gestures, such as pointing, evolve into meaning complexes built on associative relations which, in turn, evolve into meaning-making tied to the material context (pseudoconcepts). This form of meaning-making eventually evolves into true generalised concepts.

The development of word meaning and speech function, from social communication to ‘true’ concepts, was studied by Vygotsky in the context of formal school instruction. Through educational knowledge, children’s use of words and speech functions shifts from contextualised social communication to the decontextualised encoding of systems of knowledge (Minick 2005 [1987], pp. 45-46; Vygotsky 1986 [1934]).
In this study Montessori ensembles are interpreted as a complex of mediational means designed to shift children’s meaning-making from local context-bound experience towards generalisable, decontextualised and recontextualisable, educational knowledge. While Vygotsky identifies word meaning and speech function as central to this process, his theory does not encompass the web of meaning relations activated by semiotic mediation. In this study, the text, as modelled by social semiotics, is proposed instead as the unit most applicable to the analysis of the Montessori objects as mediating materials.

5.3.2 From word meaning to text as a unit of meaning

For Vygotsky, words have two characteristics which make them the ideal basis for the analysis of meaning. First, a word represents a holistic system as ‘a living union of sound and meaning’ in which the meaning component of this union is itself a unit of thought and language (Vygotsky 1986 [1934], p. 5). Second, words are used to generalise and refer to groups, or classes, of things. Thus, words, meaning and thought represent reality removed from the way sensation represents reality (Vygotsky 1986 [1934], p. 6).

Vygotsky’s choice of the word as the unit for analysing meaning as system and for generalising beyond sensory experience has subsequently been shown to be too limited when it comes to examining semiotic mediation in terms of function (For example, Wertsch 1985a, pp. 196-208; Hasan 2005 [1992], p. 84). To resolve the problem, Wertsch (1985a, pp. 202-208; pp. 231-224) suggests drawing on activity theory and following Leont’ev, and Bakhtin’s modelling of language processes such as dialogue. In a contrasting view, Hasan (for example, 2005c, pp. 145-146; 2005 [1995], p. 121) argues that neither activity theory, nor Bakhtin’s approach, has the capacity to account for a sufficient range of relevant facets of meaning-making.

1 When Vygotsky emphasises the unity of components such as a thought and a word, he often draws on a chemical metaphor, the water molecule, in which the elements hydrogen and oxygen combine to become, not a mixture of the two gases, but a new substance, water (For example, Vygotsky 1986 [1934], p. 4; see also Minick 2005 [1987], p. 54, n. 11, Wertsch 1985a, pp. 193-194). The thought-word relation, however, is not fixed, but one that evolves in the process of ontogenesis (Vygotsky 1986 [1934], pp.210-211).
Instead, ‘a well-articulated theory of meaning construal’ is needed, a theory which ‘goes beyond word without abandoning attention to it’ (Hasan 2005c, p. 148).

The theory Hasan proposes is the social semiotic theory of meaning, with systemic functional linguistics as an analytic framework. This theory emerged from the work of Michael Halliday (1978, 1985, 1994, 2004a), and is elaborated in, for example, Halliday and Hasan (1976), Martin (1992) and Matthiessen (1996). Systemic functional linguistics enables an analysis of meaning-making which brings into holistic relation the various views of language which feature in Vygotsky’s explanations of semiotic mediation, including language as word, as function, as system, as signal, as sign and as a process evolving through use. A systemic functional account describes words as entering into grammatical structures, identified in terms of function and related in terms of paradigmatic systems. Words combined into grammatical structures are an expression of meaning, and meaning is linked to the context of language use. In other words, in this framework, meaning is ‘not limited to word meaning’ and ‘the meaning of language in use is not the sum of the meanings of individual words, phrases and sentences’ (Hasan 2005 [1992], p. 100). Specifically, within this framework, ‘[t]he natural unit for semiotic mediation is not the word, but text/discourse - language operational in a social context’ (Hasan 2005 [1992], p. 83 [emphasis added]; see also Halliday and Hasan 1985). To account for the unity of language, its use and its context requires a framework modelled as a system of relations.

5.4 The significance of a relational model of meaning-making

The central design feature of the Montessori objects, inherited from Séguin’s prototypes, is that they materialise systems of relations. The foundation of the educational system designed by Séguin (1971 [1866], p. 95) for ‘idiot’ children was the premise that ‘contrast is power’. The contrastive relations materialised in the concrete objects constituting Séguin’s educational system were given a new incarnation in 1907 when Montessori’s famous school opened in the slums of Rome. In that same year, in Geneva, de Saussure was delivering a course of lectures which
put forward the premise that ‘in a language there are only differences’ (Saussure 1983 [1915], p. 118).

Saussure describes language as a system of oppositional relations between linguistic signs. A linguistic sign ‘is a link between a concept and a sound pattern’, between ‘signification and signal’ (Saussure 1983 [1915], pp.66-67). The relation between signal (sound pattern) and signification (concept) within the sign has no motivation, it is arbitrary. A sign’s value, or valuer, depends on ‘what other signs surround it’ (p. 118), its place in a paradigmatic system, as summarised by Harris (1983, p. x) in the following way:

The essential feature of Saussure’s linguistic sign is that, being intrinsically arbitrary, it can be identified only by contrast with coexisting signs of the same nature, which together constitute a structured system.

The linguistic sign, following Saussure (1983 [1915], p. 110), gives shape and differentiation to the amorphous mass of thought and sound in the environment. Furthermore, language is a collaborative, social phenomenon, ‘never complete in any single individual’ (Saussure 1983 [1915], p. 13). Conceiving of language as a shaper of thought and as a collaborative project, which extends beyond the mind of one individual, refocuses attention on Vygotsky’s proposals. Moreover, Saussure’s description of a linguistic sign, in which signal (sound pattern) and signification (concept) are united, reappears in Vygotsky’s conception of the word as a unit of sound and meaning.

The relational view of meaning, in the wake of Saussure, was expanded and enhanced from the 1920s onwards by contemporaries of Montessori and Vygotsky, including Bühler, Malinowski, Hjelmslev, Whorf, the Prague School linguists and Firth, all of whom turned their attention to different dimensions of meaning relations. The dimensions, to be clarified below, include, for example, language function (Bühler), relations between language and context (Malinowski), stratal relations (Hjelmslev),

2 In words attributed to Saussure (1983 [1915], p. 118; cited in Harris and Taylor 1989, p. 223):

A linguistic system is a series of phonetic differences matched with a series of conceptual differences.

3 Saussure (1983 [1915], p. 110) describes the relation between thought and language in the following way:

In itself, thought is like a swirling cloud, where no shape is intrinsically determinate. No ideas are established in advance, and nothing is distinct, before the introduction of linguistic structure (cited in Harris and Taylor 1997, p. 209).
the relation between language and thought (Whorf), grammatical relations (the Prague linguists) and functional variation (Firth) (Butt, 2001; Halliday 1992, 2002). These multiple dimensions have been woven together, in the work of Michael Halliday, into a unified social semiotic theory which uses systemic functional linguistics as an analytic framework, a framework which enables the description of systems of meaning in terms of the multiple relations which bring them into existence (See, for example, Halliday 2004a).

In light of this shared emphasis on relations the selection of systemic functional linguistics as an analytic framework for this study can be supported from several perspectives. First, the orientation to systemic (i.e., paradigmatic) and functional meaning relations in the work of Halliday’s predecessors shaped the intellectual context in which Montessori was designing her materials. Although there are no specific references, there is evidence that Montessori was influenced by Saussure and Bühler. The Montessori grammar materials known as the *Functions of Words*, for example, were designed during the 1920s at the time Bühler was writing about language function in Vienna, a period of great expansion of Montessori schools in that city, largely through the efforts of a student of both Montessori and Bühler (Kramer 1978 [1976]; Gardner and Stevens 1992).4

A second reason for drawing on systemic functional linguistics is that it represents an evolution of Saussure’s conception of language as a system of contrasting signs. Language is described by Halliday (2004a, pp. 19-24) as a resource comprising sets of choices from which language users select in order to make meaning. This description aligns with the design principles Montessori inherited from Séguin, which have resulted in contrastive relations being fundamental to the Montessori objects and their use.

A third reason for selecting systemic functional linguistics is its potential to account for modes of meaning-making other than language, reinforcing Saussure’s statement

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4 It is surprising that research into the links between Montessori and her intellectual contemporaries, including Durkheim, Saussure, Bühler and others, has never been undertaken by Montessori scholars. Montessori’s attempts to apply to pedagogy categories emerging from advances in physics during that era also sets up potential for comparison with scholars such as Firth, who was studying indeterminacy and variation in language (Butt 2001, p. 1812). Such lines of research, in my opinion, would greatly enrich and expand our understanding of the Montessori objects and their use, and assist in locating Montessori appropriately in the history of twentieth century ideas.
that ‘linguistics serves as a model for the whole of semiology, even though languages represent only one type’ (1983 [1915], p. 68). Specifically, it has the potential to capture the features of semiotics other than language, including designed semiotics such as mathematics, or nonverbal semiotics such as music or dance (Halliday 2004a, p. 20).

The Montessori objects can be thought of as a designed semiotic, recoding the verbal meanings of educational knowledge in nonverbal forms, in order to mediate these meanings for children. The mediational function of the Montessori objects further supports the selection of systemic functional linguistics as a means of analysis. As argued by Hasan (2005 [1992], 2005 [1995]; 2005c), analysing the word, the unit of sound and meaning proposed by Vygotsky, will not account for the complex meaning relations of semiotic mediation. By identifying text as the unit of meaning, systemic functional linguistics makes possible the analysis of meaning relations from multiple viewpoints, not only the relation of meaning to sound, or any other expression form, but also its relation to context and to the language system as a whole, and other semiotic systems as well.

5.5 Social semiotics: a socio-semiotic view of meaning

5.5.1 The multiple dimensions of semiosis: towards a social semiotic analytic framework for Montessori pedagogy

Systemic functional linguistics rolls out a multidimensional map of semiosis, which Halliday (2004a, p. 5) glosses as ‘the making and understanding of meaning’. At the centre of this map lies a functional description of grammar, in which grammar is presented from ‘the standpoint of how it creates and expresses meaning’ (Halliday 2004a, p. 19) and explored along more than one axis, or dimension.

Having argued that ‘everything [in language] depends on relations’, Saussure (1983 [1915], p. 121) described linguistic relations in terms of two axes: relations based on paradigms, or sets of alternatives, and linear, or syntagmatic, relations. Both axes are incorporated into the functional description of grammar, which models grammar in terms of two complementary dimensions: systems of choice and structural chains. The following overview of the systemic functional framework begins by exploring the
nature of grammar from the perspective of system and concludes with an exploration of elements of grammar from the perspective of structure. In the process grammar will be explored along the dimensions of instantiation, realisation and metafunction (Halliday 2004a, pp. 19-33).

Significantly, each of these dimensions enables a different perspective on learning as a semiotic process, ‘a process of making meaning’ (Halliday, 1993b, p. 93), and as a process of expanding the potential to make meaning. Social semiotics models language development and learning as the same phenomenon, whether a child is learning spoken language and knowledge about the everyday world in infancy and early childhood, or learning written language and educational knowledge in the school years. Language is not viewed as merely one aspect of knowledge, but as ‘the essential condition of knowing, the process by which experience becomes knowledge’ (Halliday, 1993b, p. 94; emphasis in original). From this perspective, therefore, when the multidimensional map of semiosis is used to explore the ontogenesis of language, the ontogenesis of learning and knowledge is also being explored.

5.5.2 System

Understanding language as system derives from Saussure’s conception of language in terms of contrasting signs, a conception which resonates with the use of contrastive relations as a central design feature of the Montessori objects. This relational view underpins the functional description of grammar.

Unlike traditional and formal grammars, a functional grammar does not list grammatical structures in inventories but as ‘a network of interrelated meaningful choices’ made up of paradigmatic sets of options, with the meaning of each option defined by its alternatives. In other words, ‘the fundamental components of the grammar are sets of mutually defining contrastive features’ (Halliday 2004a, p. 31). Thus, while the constituents of grammar are organised into meaning-making structures, the structures result from selections from systems of meaning. In other words language is modelled as a meaning potential available to the user, a resource for making meaning.
The system dimension also foregrounds the role language plays in interpreting ‘the whole of our experience’, a role Halliday (1978, p. 21) describes as one which reduces:

... the indefinitely varied phenomena of the world around us and also of the world inside us, the processes of our own consciousness, to a manageable number of classes of phenomena.

The manageable classes of phenomena Halliday identifies are those encoded through the systems of grammatical choices which realise the meaning potential of a language. The relevance of the view of language as meaning potential, that is, a system of contrastive relations, to an understanding of ontogenesis has been demonstrated in social semiotic studies by Phillips (1985) and Painter (1999a). Both these studies go some way towards explaining the mediational potential of the Montessori objects, that is, the value of using materialised contrastive relations to draw children’s attention to culturally, and educationally, relevant meaning systems.

The study of infant language by Phillips (1985, p. 165), proposes that ‘the linguistic means for the reduction of the phenomena of the world, and to some extent the world of the mind’, to a manageable level emerges with the development of comparison and contrast in a child’s language, ‘a development which forces closer inspection of difference’ (p. 167). Moreover, Phillips argues that:

... learning proceeds by a process of classification and subclassification with finer and finer distinctions becoming possible, realized through a greater range of lexicogrammatical means (p. 175).

This ontogenetic process does not simply involve ‘growth in the size of the lexicon’ through naming, or indication in Vygotsky’s terms, but ‘a growth in [the child’s] ability to organize, - i.e. classify - kinds of knowledge’. First, the child contrasts and compares semantic categories on the basis of lexical choices, and then generalises these categories on the basis of grammatical choices. The ontogenetic pathway described by Phillips aligns with Vygotsky’s description of the development of the function of indication from gesture to word meanings, but enriches this description because the process is presented in terms of the development of systems of words and grammar.
Phillips’s arguments are supported by Painter’s case study of one child’s language development from the age of two-and-a-half years to five years. In this study a detailed analysis of the child’s expanding lexicogrammar reveals that ‘the realization of comparison and contrast relations pervades the development of the entire linguistic system at the heart of the deployment of language for learning’ (Painter 1999a, p. 321). This characteristic of the child’s developing system reflects the nature of semiotic systems in general, as they are modelled by systemic theory:

Systemic theory suggests that semiotic systems are modelled as paradigmatic resources organized in terms of value relations. Given this, a fundamental strategy for building them will be to engage in comparison and contrast - to compare like meanings and forms with some point of difference between them and to contrast different meanings and forms against a background of similarity between them. This is not only the stock in trade of the linguist but also that of the child as the builder of the semiotic system (Painter 1999a, pp. 320-321).

The developmental potential of the contrastive relations built into the design of the Montessori objects will be explored in the next chapter by building on the approach suggested by Phillips, and elaborated by Painter (1999a; 1999b), that is, by tracking the potential of the objects to expand children’s meaning potential. The next section, meanwhile, will explore how conceiving of the language system as meaning potential opens up a dimension for exploring how this potential is realised by language in use. This is the dimension of instantiation.

5.5.3 Instantiation

Language viewed as meaning potential, a system of choices, is only one of the multiple perspectives made possible by a relational model of meaning-making. A relational model also makes it possible to view language in terms of the way choices from the system are instantiated in actual contexts of use. This view of instantiation represents an evolutionary development beyond Saussure’s original conception of language as a system of ‘differential values’ (Firth 1957, p. 180). Saussure’s sharp distinction between the language system as a whole (langue) and specific instances of language use (parole) is well-known. In contrast, systemic theory models the language system and specific instances of language use as different views of the same phenomenon. Further, such an analysis specifies the text as the unit of meaning in
which the potential of the system is instantiated. On this basis a text is defined as ‘any instance of language, in any medium, that makes sense to someone who knows the language’ (Halliday 2004a, p. 3).

Understanding the dimension of instantiation in this way makes it possible to explain how, in ontogenesis, a child’s meaning potential expands as a function of the intersection between texts (particular instances of language use) in the child’s environment and the potential for meaning-making (the system) available to the child at particular points in time along the ontogenetic pathway. It is in this sense that Montessori ensembles can be considered as texts, as instances of meaning-making, which function to expand children’s meaning potential.

In daily life a huge variety of texts swirl around us while the language system underlying this variety remains comparatively stable. This is often explained through the analogy of weather and climate. When we observe variable instances of weather over longer periods of time, relatively stable patterns become apparent and it is possible to describe weather in terms of climate, the relatively stable potential which underlies the variation we experience from day to day (Halliday 2004a, pp. 26-27). Just as climate changes when more variable instances of weather disturb the pattern, so the language system can develop and change.

Similarly, in ontogenesis, a child’s language system, or meaning potential, develops in response to the many texts, or instances of language use, experienced by the child. The developing potential makes it possible for the child to participate in texts, that is, to make meaning. The following description of this ‘continuous dialectic’ by Painter (1999a, p. 54) resonates with the way Montessori and Vygotsky describe ontogenetic potential in terms of sensitive periods and the zone of proximal development:

... a child may be enabled, in dialogue with a conversational partner, to create texts that are slightly beyond the current systemic potential. These collaboratively produced texts perturb the system, in that they are being processed as well as produced, so that in time the system extends to accommodate the new possibilities.

The collaboratively produced texts in Painter’s study occur spontaneously and incidentally in everyday interactions between child and adult across a variety of contexts. Montessori ensembles, in contrast, are planned routines, limited to the context of pedagogy. They are consciously designed to extend children’s meaning
potential to accommodate previously specified aspects of culture. They are deliberately selected from a programmed curriculum and they are presented to a child on the basis of interest and developmental stage. Furthermore, while a Montessori ensemble is collaborative, the collaboration is carefully staged and regulated, initially at least. The routinised, preplanned, choreographed nature of the Montessori ensemble has consequences for analysis which again relate to the dimension of instantiation.

The dimension of instantiation can be represented diagrammatically as a cline with potential and instance as the poles. The dialectic between the relative stability of the system and variability of texts is explained along this cline in terms of context. The context of the language system is the relatively stable context of the social system as a whole, the context of culture. The relation between the language system and the context of culture is one of realisation. This relation is located on the potential end of the cline of instantiation. The context of a text, an instance of the system, is the immediate situation in which it is used, the context of situation. The context of situation encompasses a set of variables which shape, and are shaped by, the text. The relation between text and the context of situation is also one of realisation, and this relation is located at the instance end of the cline of instantiation. Just as a text is an instance of the language system, so is a context of situation an instance of the context of culture, as illustrated in Figure 5.1 (adapted from Halliday 2004a, p. 28).
Although there are an infinite number of possible contexts of situation, they can be grouped into a much smaller, and more manageable, number of situation types. Situation types realise typical sets of variables, or ‘patterns of instantiation’, known as registers (Halliday 1978, pp. 29-32, 1989, 2004a, p. 27). A register is ‘the semantic variety of which text is an instance’ (Halliday 1975, p. 126). Situation types, realised as related sets of registers, can be considered in terms of sub-potentials, or instance types, which fall between potential and instance along the dimension of instantiation.

The types of situations which are typical of pedagogy, for example, are realised in the registers which encode both educational knowledge and student-teacher relationships. In other words, the contextual variables of situation types which are characteristic of pedagogy constrain the potential of the language system in predictable ways. These types of situations realise sets of registers which predict the types of text which are typically used in schools. The location on the cline of instantiation of sets of related registers and the situation types they realise is illustrated in Figure 5.2 (adapted from Halliday 2004a, p. 28).
This study proposes that ensembles in which the use of Montessori objects and language are combined can best be understood as ensembles of multimodal educational resources, with the potential to be instantiated in classrooms as highly structured multimodal contexts of situation realised through highly structured multimodal texts. The scope of the present study, however, does not extend to the analysis of specific Montessori ensembles through specific texts. This would require the collection and analysis of data in which the actual use of the Montessori objects is recorded. The present study, nevertheless, represents a preliminary step toward such a project. The task of the present study is to explore the Montessori ensemble as meaning potential, that is, as a situation type realised as a text type. A situation type, and its realisation as text type, is located part way along clines of instantiation, between, respectively, culture and context of situation, and between meaning potential and meaning instance. The precision of the design specifications of the Montessori objects and the pre-planned, often rehearsed, use of the objects, and the accompanying language, predicts that variation between specific instances of ensembles will be
relatively constrained, and a description of the ensemble will retain its relevance when applied to actual contexts of use.

In this section the relation between context and language has been introduced as one of realisation. The potential for meaning expansion along this dimension will be elaborated in the next section.

5.5.4 Realisation

Realisation is a dimension which is activated when we think of language in terms of layers, or strata, just as Vygotsky (1986 [1934], p. 5) did when, in his search for a unit of consciousness, he turned his attention to the word in order to capture ‘the living union of sound and meaning’. Because Vygotsky’s frame of reference was limited to the word, however, the full extent of this living union was not visible to him.

Vygotsky gives us a picture of a simple sign in which meaning is expressed directly as sound. In this sign there are two layers, or strata: a content layer (meaning) and an expression layer (sound). An example of a simple sign is a traffic light in which the meaning Go is directly expressed as a green light, one option in a simple system of three possible signs (See, for example, Eggins 1994, pp. 13-14). The first meanings an infant makes is a protolanguage of simple signs. The content, made up of meanings representing the child’s interactions with others and the child’s experience of things and events, is expressed directly in sounds or gestures (Halliday 1975; Painter 1984). The two layers of a simple sign are represented diagrammatically in Figure 5.3.
Protolanguage is only a stepping stone on the infant’s path towards language use itself because meanings in a system of simple signs are tied directly to expressions and the capacity for expanding meaning potential is limited. In contrast, language is a semiotic with a meaning potential which has a virtually unlimited capacity to expand. This is because the relation between meaning and expression is mediated by words organised into structures. In this respect, Vygotsky’s focus on word meaning is a reasonable one, in that it recognises that words have a role in the expansion of meaning potential, and the co-evolution of consciousness. Attending to words as units, however, rather than the structures, or grammatical patterns that words enter into, makes it difficult to see the powerful mediating role played by structures, or ‘wording’, in the construction of meaning. This mediating role becomes more visible when words (lexis) and grammar are integrated as one meaning resource (lexicogrammar).

Language transforms interactions with others and experience of the world into meanings, and organises those meanings by realising them in structural patterns, or lexicogrammar. In this way the content layer of language is expanded into two layers: a layer of semantics and the layer of wordings, or lexicogrammar. The structures we choose at the layer of lexicogrammar are motivated by the meanings we are making. To share the meanings structured in words and grammar with others, we represent them as sounds, writing, gesture or sign language, at the layer of expression. The expression forms we use are, to a large degree, not motivated by the meanings we are
making. They are conventional, or arbitrary in Saussure’s sense. In summary, a multistratal picture of language emerges, as illustrated in Figure 5.4.

Figure 5.4: The multiple layers of language

The dimension which links the three layers of language is realisation; lexicogrammar realises semantics and expression realises lexicogrammar.

As introduced in the previous section, the dimension of realisation also links language to the context in which it is embedded. In this way, the expanded picture of language becomes one of layered multiple coding as illustrated in Figure 5.5 (adapted from Halliday 2004a, p. 25).
Reading from this diagram, semantics can be said to *realise* context, while semantics, in turn, is realised as lexicogrammar which is *expressed* as sounds, writing or gesture. Along the dimension of realisation, the complex phenomenon of language can be explored in terms of different levels of organisation. Language is explained by Halliday (2004a, p. 26; emphasis in original) in terms of the dimension of realisation in the following way:

A language is a series of redundancies by which we link our ecosocial environment to non-random disturbances in the air (sound waves) ... The relationship among the strata—the process of linking one level of organisation with another—is called realization.

By looking to the union of sound and meaning to analyse consciousness, Vygotsky took a step towards the conclusion reached by Halliday (2004a, p. 25) that the stratification of the content plane of language is implicated in the phylogenetic evolution of the human brain and the ontogenetic development of human consciousness, including the construction of educational knowledge.

Systemic theory looks to semantics, the layer of the content plane which realises context, for the unit of analysis, *text*. A text emerges from the realisation of systems of meaning (semantic systems) in lexicogrammatical structures. While the relation of text
to the language system as a whole lies along the dimension of instantiation, the relations of text to the context of language use lies along the dimension of realisation.

In Chapter 7 the realisation dimension will be used to trace the pathway of literacy development carved out for children by Montessori pedagogy, with particular reference to the foregrounding of lexicogrammar. In order to explore the Montessori literacy pathway in detail, it will be necessary to describe lexicogrammatical structures which realise three simultaneous strands of meaning reviewed in the next section.

5.5.5 Metafunction

In any context of language use, including pedagogic contexts, three sets of situational variables shape the variety of language which distinguishes the texts used in that context. These variables are field, or the social activity taking place (eg: solving arithmetic problems in junior primary school), tenor, or the relationship of the people taking part in the interaction (eg: child and teacher), and the mode, or the role language is playing in the context, including the channel being used to communicate (eg: face-to-face spoken language in an interaction incorporating concrete objects).

These three variables [field, tenor and mode], taken together, determine the range within which meanings are selected and the forms which are used for their expression. In other words, they determine the ‘register’ (Halliday 1978, p. 31).

The three situational variables are realised in language as three simultaneous strands of meaning, or metafunctions. The metafunctions produce ‘a polyphonic composition in which different semantic melodies are interwoven, to be realized as integrated lexicogrammatical structures’ (Halliday 1978, p. 112).

Lexicogrammatical structures realising field construe experience through ideational meanings, lexicogrammatical structures realising tenor enact social relationships through interpersonal meanings and lexicogrammatical structures realising mode enable the composition of relevant and cohesive texts through textual meanings. All these meanings are conflated and integrated into the structure of the clause. The metafunctions represent a further dimension along which the expansion of meaning potential can be explored (Halliday 2004a, pp. 29-30).
The grammatical systems, which transform human experience into ideational meaning, make it possible to reflect on and understand our internal and external experience. In the context of pedagogy, ideational meaning transforms this experience into educational knowledge. The experiential component of ideational meaning is patterned into semantic figures (realised grammatically as clauses), made up of processes (doing, saying, sensing, being or having) and their related participants and circumstances. The logical component of ideational meaning links the figures as complexes of clauses, on the basis of, for example, time or cause. How the grammatical resources for making ideational meaning are deployed in a text depends on the field, which predicts the topic of the text, whether the text uses everyday or technical language, and how the text unfolds logically.

The grammatical systems, which transform social relationships into interpersonal meaning, make it possible to structure language for action and for interaction, as well as to express points of view. Semantic units of interpersonal action (commands and offers) and interaction (statements and questions) are realised grammatically as clauses. In the context of pedagogy, interpersonal meaning enacts the relationship between students and teachers. How the grammatical resources for making interpersonal meaning are deployed in a text depends on the tenor of the context of situation, which predicts how social relationships are represented in the text and how points of view are expressed.

The grammatical systems, which realise textual meanings, have an enabling function. These systems organise ideational and interpersonal meanings into cohesive and coherent text. Semantically, ideational and interpersonal meanings are organised into units of information, or messages (realised grammatically as clauses). It is through textual meaning that language creates ‘a semiotic world of its own’ (Halliday 1993b, p. 107). Significantly, in the context of semiotic mediation, textual meanings regulate how attention is paid to elements of a text by giving some elements more prominence, or salience, than others. How the grammatical resources for making textual meaning are deployed in a text depends on the mode of the context of situation, which predicts whether the text will be in spoken, written or some other form, including multimodal combinations. The mode also predicts how congruent, metaphorical or abstract the
meaning-making will be. Textual meaning plays a central role in pedagogic contexts because of the focus in these contexts on literacy development.

The metafunctional organisation of meaning in texts has been used as a basis for functional accounts developed for semiotics other than language (Kress and van Leeuwen 1996; Martinec 1998, 2001; O’Halloran 1998; O’Toole 1994; Ravelli 2006; Stenglin 2004; Unsworth 2001). These accounts have used a metafunctional analysis to describe how multiple modes of meaning-making, including images, objects, movement, symbols, visual display and designed spaces, sometimes in combination with language, realise the representation of experience and logical relations (ideational meanings) and social interaction (interpersonal meanings), as well as the composition of these realisations into meaningful, cohesive semiotic units (textual meanings). A similar metafunctional generalisation is needed for a description of the Montessori ensemble because it is a text-type which realises two sub-units of meaning (objects in use and language in use) across three modes of meaning-making (objects, movement, language).

5.5.6 Structure

Lexicogrammatical structure is modelled in systemic theory as chains of constituents. Constituents relate to each other in terms of their position on hierarchical scales of rank. Each constituent of structure is made up of one or more constituents from the rank below. For example, in spoken expression, syllables are made up of phonemes, constituents of a lower rank. Similarly, in written expression, sentences, the highest rank, are made up of phrases, which are made up of words, which, in turn, are made up of letters, the smallest constituent of writing (Halliday 2004a, p. 20). Both these hierarchies, however, are merely a reflection of the central hierarchical scale of language, the grammatical rank scale. This is because grammar is ‘the central processing unit of language, the powerhouse where meanings are created’ (Halliday 2004a, p. 21). The focus of this section is the organisation of meaning in grammatical structures. The examples in this section refer to a Montessori ensemble, the folding

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5 The convention in systemic functional linguistics is to distinguish clearly between grammatical units and units of writing. For this reason, the term clause is used to identify a grammatical unit, while the term sentence is used to identify a unit of writing (Halliday 2004a, p. 8)
cloths, which is a preliminary exercise often presented to children when they first arrive in Montessori classrooms at around three years of age.

The unit of grammar is the clause.

Example

The new child is taking the basket of folding cloths from the shelf.

A clause is made up of groups and phrases, the essential element of a clause being a process expressed by a verbal group. A group is a combination of words built around a head-word, for example, a nominal group built around a noun, or a verbal group built around a lexical verb. A phrase is a nominal group preceded by a preposition.

Examples

The new child
nominal group
is taking
verbal group
the basket of folding cloths
nominal group
from the shelf.
prepositional phrase

Groups and phrases are made out of different classes of words, for example, nouns, pronouns, adjectives, articles, verbs, adverbs, prepositions and conjunctions.

Examples

is
auxiliary verb
taking
lexical verb
from
preposition
the
article
shelf
noun

Words are made of word parts or morphemes.

Example

take
morpheme
-ing
morpheme
The rank scale along which grammatical structures are ordered is represented diagrammatically in Figure 5.6.

<table>
<thead>
<tr>
<th>The unit of grammar is the clause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clauses are made out of groups and phrases</td>
</tr>
<tr>
<td>Groups and phrases are made out of words</td>
</tr>
<tr>
<td>Words are made out of morphemes</td>
</tr>
</tbody>
</table>

**Figure 5.6: The rank scale of grammar**

Each rank represents sets of alternative choices, or systems, for making meaning. The rank scale generates two further possibilities for expanding meaning.

First, constituents from the same rank can be joined to make a *complex*.

**Examples**

*After the teacher and the new child finished the presentation, the child took the basket of folding cloths from the shelf independently.*

clause complex

*the teacher and the new child*  
nominal group complex

Second, constituents from one rank can be shifted down a rank to function in the structure of a unit of its own rank or a lower rank. For example, a clause can function within the structure of a nominal group to qualify the meaning (Halliday 2004a, pp. 9-10). In the context of ideational meaning, for example, a clause, which more typically realises the semantic unit, a *figure*, can function, non-congruently, in an adjectival role to realise, at the level of semantics, a *part* of an *element* of a *figure*. Slippage of this kind in realisation across strata is an example of *grammatical metaphor* (Halliday 2004a, pp. 586-658).
In functional grammar structural elements are labelled, not only in terms of category or class (located on the rank scale), but also in terms of meaning-oriented functions. Functional labels show how choices from each metafunctional meaning system are woven into each structure. The example below shows how ideational functional elements conflate with grammatical classes.

**Example**

The new child is taking the basket of folding cloths from the shelf.

**Example**

<table>
<thead>
<tr>
<th>Function</th>
<th>Class</th>
<th>Participle</th>
<th>Process</th>
<th>Circumstance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTICIPANT</td>
<td>nominal group</td>
<td>the basket of folding cloths</td>
<td>verbal group</td>
<td>prepositional phrase</td>
</tr>
</tbody>
</table>

Furthermore, while particular grammatical functions are represented by typical, or default, grammatical classes within each metafunctional domain, these relations are not fixed. For example, typically, in the domain of ideational meaning, a *process* is represented by a verb group, a *participant* by a noun group and a logicosemantic *relation* by a conjunction, but this is not inevitable. The potential for slippage between a function (meaning) and a default class (form) represents a further possibility for the expansion of meaning potential. This slippage is another example of grammatical metaphor.

<table>
<thead>
<tr>
<th>Function</th>
<th>Class</th>
<th>PARTICIPANT</th>
<th>PROCESS</th>
<th>PARTICIPANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVENT</td>
<td>nominal group</td>
<td>(EVENT)</td>
<td>(RELATION)</td>
<td>(EVENT)</td>
</tr>
</tbody>
</table>

In summary, the grammatical rank scale is a hierarchy of constituents underlying the structural relations of the grammar of a language. In this hierarchy, the word does not have the status, given by Vygotsky, as a stand-alone unit of meaning. Its relation to meaning is in terms of the systemic and structural relations into which it enters. The grammar of a language makes meaning, drawn from a systemic meaning potential, by organising words into structures. Despite his focus on word meaning, Vygotsky (1986 [1934], pp. 180; 184) does draw attention to the significance of a child learning grammatical structures consciously in the context of learning to write at school and its
‘paramount importance for the mental development of the child’. In contrast to the unconscious learning of spoken language, Vygotsky (1986 [1934], p. 182) points out, learning to write is ‘conscious work’, in which a child ‘must put words in a certain sequence to form a sentence’. He describes this work as ‘deliberate semantics - deliberate structuring of the web of meaning’.

In Chapter 7 the Montessori materials for learning about grammar will be reviewed in terms of their role in developing a deliberate semantics. The following section, meanwhile, returns to the metafunctional architecture in order to lay the analytic groundwork for interpreting the combined multimodal elements of the Montessori ensemble in terms of a single semantic unit.

5.6 The Montessori ensemble as a multimodal semantic unit

Recognising the combined multimodal elements of a Montessori ensemble as a cohesive semantic unit, a text (an instance of a text type) is, arguably, a theoretical re-expression of its pedagogic use. Each ensemble is presented to children in order to create a unified semantic impression or footprint, which children can later fill in and elaborate linguistically. This use resonates with the argument made by Halliday (1998, p. 223), on the basis of his own and Painter’s data, that in ontogenesis and throughout life, ‘[t]he semantics runs ahead of the grammar’ of the language.

Using a metafunctional framework and its link with the variables of the context of situation (field, tenor, mode), this section demonstrates how semantic categories can be applied to initiate a close analysis of the Montessori ensemble as multimodal mediationsal means. Semantic categories, and the relations between them, will be used to model and interpret the metafunctional framework of a sample ensemble, or, in other words, how the ensemble represents experience and logic (ideational meanings), enacts social interaction (interpersonal meanings) and how these meanings are composed into a meaningful, cohesive semiotic unit (textual meanings). For each metafunction this step is followed by an exploration of how the semantic categories and their relations are realised in the lexicogrammar when the meanings are expressed linguistically.
The analysis is demonstrated using an ensemble based on the folding cloths, a preliminary practical life exercise often presented to children around three years of age when they first enter Montessori classrooms. This is one of the simplest ensembles of the Montessori repertoire, but it incorporates the indexical features of all Montessori ensembles. The direct aims of the exercise are to develop in children fine motor coordination (hand-eye, finger-thumb grasp), voluntary control of attention (concentration) and independence in the care of themselves and the classroom (the ability to fold and put away cloths such as those used for cleaning). The indirect aim is to foreshadow educational knowledge about plane geometric figures and their construction.6

5.6.1 The ideational meaning potential of a Montessori ensemble

Ideational meanings realise the contextual variable of field, which, in the context of a Montessori ensemble, is learning about a region of educational knowledge. These meanings represent experience and logic. They will be explored in this section as a means of revealing how Montessori pedagogy embodies in material and linguistic modes the following claim:

... 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).

The ideational semantic categories proposed by Halliday and Matthiessen (1999, pp. 48-49) are organised at two levels. First, experiential meanings are organised along a rank scale of part-whole relations. The figure is the highest rank of this scale. A figure is made up of single elements, and the elements are made up of parts. Second, the figures are organised into complexes, or sequences, on the basis of logical relations.

The way these categories might be applied to a Montessori ensemble is exemplified in this section using the folding cloths. The folding cloths are four cloths which are identical in shape (square), size (250mm2), colour (plain) and fabric. Children follow embroidered lines to fold the cloths into different shapes and sizes.

6 The description of the folding cloths ensemble in this section is adapted from a Montessori teacher’s album, my own, prepared during the inaugural course of the Sydney Montessori Teachers’ College (1983-84).
The elements of the folding cloths ensemble are objects (‘the cloths’) and hand movements (‘folding’, ‘arranging’). These are combined and recombined into figures (‘the folding of the cloths’, ‘the arranging of the folded cloths’). Some parts of the elements are kept constant (‘colour’, ‘shape’, ‘texture’, ‘finger-thumb grasp of the hand’) and other parts vary systematically (‘lines embroidered on the cloths’, ‘direction of movements’). The parts of the folding cloths can be seen in Illustration 5.1.

![Illustration 5.1: The folding cloths](image)

In Illustration 5.1, the first image shows a folding cloth with a contrasting embroidered line. The second image shows the full set of cloths. The way a folding cloth and a movement combine dynamically into figure, a dynamic quantum of ‘experiential change’ (Halliday 2004a, p. 169), is depicted in Illustration 5.2. In this figure the finger and thumb of the hand grasping one corner of the cloth fold the corner over to match its opposite.7

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7 Each movement in a Montessori ensemble is pre-analysed and rehearsed by the teacher before it is presented to children. During the presentation the teacher leaves a slight pause between each movement. For these reasons, the boundary between figures is relatively easy to determine.
The dynamic figures of the folding cloth ensemble are organised into sequences through temporal relations, each figure following the preceding one. For example, the figure in which the cloth is folded by matching the grasped corner with its opposite follows the figure in which the corner of the cloth is grasped. A sequence of dynamic figures, such as those which realise the folding cloths ensemble, is described by Martin (1992) as an activity sequence. Each figure in the sequence is derived from taxonomies of ‘actions, people, places, things and qualities’ (Martin 1992, p. 292).

The activity sequence in the folding cloths ensemble concludes with a synoptic final array of all the folded cloths. In the array the folded cloths are transformed into static elements related on the basis of comparative value (large, small) and class (rectangle, square, triangle). The final array is shown in Illustration 5.3.

In the Montessori tradition the expression of culturally-significant semantic categories and relations in the form of semiotically-loaded objects and movement is said to leave
an *impression* on children, an impression which could be thought of as a semantic footprint, or outline. When language is used concurrently, or at a slight lag, to express these same categories, an abstract layer of semiotic organisation intervenes between meaning (semantics) and expression. This abstract layer, the lexicogrammar, gives the semantic categories ‘semiotic energy’ (Halliday 1998, p. 189), filling them in with meaning which is generalisable and transportable in time and space beyond the immediate context in which the objects are used.

How the rank scale of experiential semantic categories (sequences, figures, elements and parts of elements) is typically realised in the rank scale of grammatical structures (clause complexes, clauses, groups/phrases and words) is illustrated in Figure 5.7.

![Figure 5.7: Typical grammatical realisation of sequences, figures and elements (adapted from Halliday and Matthiessen 1999, p. 49)](image)

The lexicogrammar configures semantic ideational categories into clause structures selected from the grammatical system of **transitivity**. The grammatical system of transitivity imposes ‘order on the endless variation and flow of events’ (Halliday 2004a, p. 170), distinguishing at the most basic level, the processes of the outer, material world from the inner, mental processes of consciousness.
Examples  

*The new child is taking the basket of folding cloths from the shelf.*  
PROCESS OF THE OUTER WORLD (MATERIAL PROCESS)

*The new child likes the folding cloths activity and always chooses it.*  
INNER PROCESSES OF CONSCIOUSNESS (MENTAL PROCESSES)

In addition there are relational processes, which relate ‘one fragment of experience to another’, either through identification or attribution.

**Example**  
*These are the folding cloths.*  
RELATIONAL PROCESS: IDENTIFYING  
*The folding cloths are a preliminary exercise.*  
RELATIONAL PROCESS: ATTRIBUTIVE

Finally, verbal processes represent the processes of symbolic exchange.

**Example**  
*The new child always asks for the folding cloths.*  
PROCESS OF SYMBOLIC EXCHANGE (VERBAL PROCESS)

The categorising of experience through the transitivity system is described by Halliday (1998, p. 190) as a kind of ‘metaphorical process’, which ‘involves transforming the material into the semiotic.’ The interweaving of the material and the semiotic in Montessori ensembles appears to slow down this transformation. The metaphorical process is initiated by experience with semiotically-loaded objects and unfolds in slow motion as the externally experienced meanings turn inward, through the mediation of language, for the developmental benefit of young children learning to transform local concrete experience into decontextualised educational knowledge.

In the case of the folding cloths, each dynamic material figure can be realised linguistically as a clause in which the action is expressed in the grammar as a **material process** (*grasp, fold, arrange*), and the people, objects and their elements are grammatical **participants** (*the thumb and forefinger, the corner, the cloth*) in **circumstances** (*carefully*) associated with the process, as presented in Table 5.1.
Table 5.1: A dynamic figure realised as both manipulated object and as grammatical structure

The clauses realising the dynamic figures can be sequenced through temporal relations expressed linguistically as conjunctions (*first, next, then*), as in the following example.

**Example**  
*The thumb and forefinger grasp the corner of the cloth carefully and then fold it to the opposite corner. Next the fingers smooth down the fold.*

This dynamic sequence reflects ‘the dynamic mode of commonsense grammar in everyday language use’ (Halliday 1993b, p. 111).

In contrast, the static array which concludes the dynamic sequence can be said to reflect ‘the synoptic mode of the elaborated written grammar’ used for educational knowledge (Halliday 1993b, p. 111). The now static elements are placed in a final array in order to identify their location in a system and to relate them on the basis of comparable properties and class relations. This array is an instance of the underlying design principle of the Montessori objects and their use, inherited from Séguin, the principle of contrast. In other words, the array can be interpreted as a ‘matrix of comparison’, or, an entry-level system of educational meanings.

First, placement in the array identifies each folded cloth as a value in a system of relations. The value varies with the axes of symmetry materialised by the lines embroidered on the cloth. Each embroidered line is, therefore, an instantiation of choices selected simultaneously from two sets of options, as illustrated in Figure 5.8.
Figure 5.8: The system instantiated by the embroidered lines

This system is instantiated linguistically in clauses based on relational processes, realised by the verb *is*, identifying the value of each element:

*This is the diagonal fold. This is the double diagonal fold.
This is the median fold. This is the double median fold.*

How each element is identified both materially and linguistically as a value in a system is represented in Table 5.2:

<table>
<thead>
<tr>
<th>Element</th>
<th>Figure</th>
<th>Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘folded cloth’</td>
<td></td>
<td>‘cloth folded along diagonal embroidered line’</td>
</tr>
<tr>
<td><em>This</em></td>
<td><em>is</em></td>
<td><em>the diagonal fold.</em></td>
</tr>
<tr>
<td>PARTICIPANT ROLE:</td>
<td>RELATIONAL PROCESS:</td>
<td>PARTICIPANT ROLE:</td>
</tr>
<tr>
<td>TOKEN</td>
<td>IDENTIFYING</td>
<td>VALUE</td>
</tr>
</tbody>
</table>

Table 5.2: A static figure represented as a value in a system, both materially and linguistically

Second, the array compares the elements in terms of relative size (*large, small*) and classifies them in terms of shape (*triangle, rectangle, square*). Each folded cloth is, therefore, an instantiation of choices selected simultaneously from two sets of options, as illustrated in Figure 5.9.
This system is instantiated linguistically in clauses based on relational processes, realised by the verb *is*, which attribute the elements with qualities and class membership, as represented in Table 5.3.

<table>
<thead>
<tr>
<th>Element</th>
<th>Figure</th>
<th>Element</th>
<th>Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘cloth folded along one diagonal embroidered line’</td>
<td>‘movement: placement’</td>
<td>‘properties of size and shape’</td>
<td></td>
</tr>
<tr>
<td><strong>This</strong></td>
<td><strong>is</strong></td>
<td><strong>a large triangle.</strong></td>
<td></td>
</tr>
<tr>
<td>PARTICIPANT ROLE: CARRIER</td>
<td>RELATIONAL PROCESS: ATTRIBUTIVE</td>
<td>PARTICIPANT ROLE: ATTRIBUTE</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.3: An element attributed with a value and a class, both materially and linguistically

The final array of folded cloths can, therefore, be interpreted as a double-layered system of identifying and attributive relations between elements, both realised by the verb *is*, a core part of what Matthiessen (1991) describes as the grammar of semiosis.

The layering of the two types of relational meanings, identifying and attributive, is a critical feature of Montessori pedagogy. The noteworthy feature of a Montessori ensemble is that the material figures can be realised in corresponding decontextualised, and recontextualisable, linguistic figures, even if, as in the folding cloths, these are steps left for the future. The generic, iconic design of the material elements and their parts (‘square cloths’, ‘iconic axes of symmetry’, ‘rehearsed idealised movement’) and the constrained variation of these elements (‘constant colour, size, shape and texture’, ‘variable embroidered lines’) are the origin of a developmental pathway oriented towards a corresponding decontextualised linguistic
realisation. Once realised linguistically, the folding cloths activity sequence can be recontextualised in the folding of fabric across any number of social contexts. Similarly, the final array can be decontextualised linguistically as dimensional relations \((\text{large, small})\) and categories of abstract geometry \((\text{triangle, rectangle, square})\) and later recontextualised in a variety of educational contexts. In this way, the folding cloths, and the use of the cloths in animated, material figures, orient children’s activity, and attention, towards systems of abstract meaning relations which underlie educational knowledge they will encounter in the future.

The future orientation of the folding cloths ensemble is common to Montessori ensembles in general, as will be elaborated in the next chapter. These ensembles constitute the Montessori learning environment, resonating with the claim by Vygotsky (1994a, pp. 347-349) that ‘the environment is the source of development, not its setting’. Furthermore, in Vygotsky’s view, for a child to develop a particular human attribute, an ideal form of the attribute, ‘refined and perfected by humanity through history’, must be available in the sociocultural environment. Interaction with the ideal form sets the child on the pathway towards achieving the attribute, the ideal form operating as a ‘source’ of development, in an echo of Montessori’s doctrine of finality, as outlined in Section 4.2.

Thus, a Montessori ensemble, both in its dynamic and synoptic phases, can be interpreted as a quantum of cultural experience represented in an ‘ideal form’, as a source, or origin, of the child’s developmental path. Semiotically, the ideal form embodied by the ensemble can be modelled as a semantic unit, a complex of signs, or text, which leaves a ‘footprint’, or ‘contour’, on which the child can build educational knowledge in the future. To enhance the semantic outline, the ensemble embodies the meanings ‘in stereo’, that is, in dual modes, material and linguistic, dynamic and synoptic. Returning to a Vygotskian perspective is a reminder that development also has its origin in social collaboration, a phenomenon which can be explored in terms of interpersonal meaning.
5.6.2 The interpersonal meaning potential of a Montessori ensemble

Interpersonal meanings realise the contextual variable of tenor, which, in the context of a Montessori ensemble, is the relationship between the expert presenter of the objects, usually the teacher, and the child as apprentice user. An exploration of social interaction, the interpersonal meanings, in a Montessori ensemble reveals how the ensemble enacts a region of collaboration, a zone of proximal development, to extend the child’s meaning potential and to enable the progressive handover to the child of the knowledge encoded in the use of the objects. In the Montessori tradition the relationship between the teacher and the child is understood as one in which regulation of the child’s actions is guided by the child’s interest and is gradually relinquished by the teacher as the child’s knowledge and independence increases.

Semantic categories for modelling and interpreting how a Montessori ensemble enacts social interaction are derived from categories used to model and interpret the semantics of social interaction enacted through language. The categories proposed by Halliday (2004a) represent social interaction as an exchange made up of a series of moves, each one conflated with an experiential figure. Each move in an exchange can be identified using categories from the semantic system of speech function (Halliday 2004a, p. 108). In this system, offers and commands exchange goods (things) and services (actions), and statements and questions exchange information. The folding cloths will be used to exemplify how these categories apply to a Montessori ensemble.

Initially, the teacher (‘through gesture’) and the cloths (‘arranged in an open basket and placed on an open shelf’) together offer the child the possibility of activity. The embroidered line on each cloth, and the teacher indicating the line, represent a command demanding an action (folding) and, finally, as the sequence of dynamic demands made by the lines are met, the emerging array of cloths becomes a set of synoptic statements giving information which answers (future) questions about dimensional relations and abstract geometric shapes.

When social interaction is enacted in language, the lexicogrammar realises the speech functions in structures based on the system of mood. This system propels verbal exchanges forward (Halliday 2004a, p. 111). Typically, statements are realised as
indicatives, **offers** and **questions** are realised as interrogatives and **commands** are realised as imperatives (Halliday 2004a, p. 114).

**Examples**

*These are the folding cloths.*  
*This is a triangle.*  
**STATEMENTS REALISED AS INDICATIVES**

*What are these?*  
*Are these the folding cloths?*  
**QUESTIONS REALISED AS INTERROGATIVES**

*Would you like to try this?*  
*Would you like a turn?*  
**OFFERS REALISED AS INTERROGATIVES**

*Match the corners carefully.*  
**A COMMAND REALISED AS AN IMPERATIVE**
How the speech functions are congruently realised in mood structures is illustrated in Figure 5.10.

Figure 5.10: Typical grammatical realisations of speech functions

In the Montessori tradition teachers ‘present’ an ensemble to children, either individually or in small groups. In the first move of the ensemble as exchange, the teacher invites the child to the presentation through an offer expressed in language and/or gesture. In the presentation the teacher demonstrates how to manipulate the objects in order to reach the final array. The presentation can be interpreted, following Martin (1985, pp. 6-7), as a ‘generalised’ sequence of events, or procedure, made up of a series of commands, which the child complies with through imitation. Next, the child is invited, again through an offer, to take a turn. When the child is able to imitate the steps of the procedure, the teacher withdraws and the child continues independently.

Thus, in a Montessori ensemble, what is being negotiated in the interaction between teacher and child through offers and commands is the child’s learning how to
manipulate the objects. In contrast, the negotiation of information through questions and statements, that is, the learning of the educational knowledge, is located in the interaction between the child and the objects independent of the teacher. For example, a folded cloth can be interpreted as a statement answering the question: *What shape is made by folding along the diagonal?*

The designed-in distinction between collaborative practical action and the independent construction of educational knowledge is a feature of Montessori ensembles in general. In more advanced ensembles the child’s independent construction of knowledge is further supported by the teacher introducing language to label elements of the ensemble.

### 5.6.3 The textual meaning potential of a Montessori ensemble

Ideational and interpersonal meanings are composed into cohesive and coherent semantic units of information, or messages, through textual meanings, or, in the case of non-linguistic elements, compositional meanings. It is these meanings which endow a Montessori ensemble with the potential to leave a unified, meaningful impression which children can later, once they move beyond manipulation of objects and collaboration with a teacher, decontextualise and recontextualise through linguistic means. Specifically, an analysis of textual meanings will be used to model and interpret the way the elements of the ensemble are woven together into ‘the most extensive unit of meaning’, a text (Halliday 2004a, p. 588), and the way critical elements of the ensemble are given prominence in the text. Again the folding cloths ensemble will be used to exemplify the analysis.

The Montessori ensemble comprises two sub-units, the use of objects and language use. A description of the cohesive relations which weave together the messages of each sub-unit, tying them into a whole, can be derived from the description of cohesive relations which contribute to the unity of linguistic texts first proposed by Halliday and Hasan (1976) and elaborated in Halliday (2004a) and Martin (1992).

When the objects are in their place on the shelf, they are tied together as a set by colour-coding; the colour of the cloths, for example, is echoed in the colour of the box
or basket they are stored in. Coding the objects using colour and design, reinforces their cultural ‘coding’ as a functional set. Coding redundancy of this type, both over-coding and multiple coding across modes, is a feature of Montessori pedagogy, a feature aimed at supporting independent work.

The cohesive relation achieved through redundant colour-coding, and storage as a functional set, is an echo of the cohesive relation of collocation, a relation between lexical items which tend to co-occur in linguistic text (Halliday 2004a, pp. 576-577). The cohesion between the cloths is augmented because most parts of the cloths remain constant (‘colour’, ‘shape’, ‘size’, ‘texture’, ‘embroidered lines’). The constant elements create a cohesive relation comparable to the repetition of lexical items, contributing to the cohesion of a linguistic text (Halliday 2004a, pp. 571-572). This tie is echoed in the name given to the ensemble, the folding cloths, which gathers together the four cloths as a unified set of like objects.

When the ensemble is offered to the child, the teacher uses language to name the ensemble. Naming establishes the first cohesive tie between the use of the objects and the use of language in the ensemble. This is achieved through the system of reference (Halliday 2004a, p. 549) deployed in two ways. First, the name of the ensemble ties the objects to the external sociocultural environment in a specific way. In the nominal group, the folding cloths, the article the is an example of homophoric reference, a cohesive relation which identifies an entity as unique in its cultural context (Halliday 2004a, p. 558). For example, homophoric reference is the reference used by people in Sydney when they refer to the Bridge, confident they will be understood without identifying which bridge. Similarly, in the Montessori tradition, homophoric reference is used when referring to sets of Montessori objects. This is because, traditionally, there is only ever one of each set in any classroom, the quality of uniqueness within the environment enhancing the value and attractiveness of the objects to children. In Montessori culture, terms such as the folding cloths or the red rods have taken on many of the characteristics of proper names, which apparently gives the objects the status of a canon, a source of some criticism of Montessori pedagogy from outside the culture. From inside the Montessori culture, however, the objects are not seen as separate from the context of their pedagogical use. Thus, it is the objects and their use, and the discourse which accompanies their use, which Montessorians value as canon.
This can be supported, I would argue, if the context of use in each case is interpreted as an ideal cultural form, following Vygotsky (See Section 5.6.1).

Second, in the naming, or labelling, clause, *These are the folding cloths*, the pronoun *these* is an example of **exophoric reference**, pointing outwards into the environment; the meaning represented by the pronoun *these* is only recoverable from the material context. The language is typically accompanied by a pointing gesture, and thus redundantly codes the function of **indication**, a function Vygotsky places at the beginning of the developmental pathway towards generalisation and abstraction (See Section 4.3.4).

The concrete context-bound nature of the naming clause allows the child to retrieve the adult’s symbolic meaning as a ‘signal’ for something that is ‘physically present to the senses’ (Hasan 2005c [1992], p. 81). That this move is within the meaning potential of a small child is supported by Painter (1999, p. 130), who records a two-year-old child using homophoric and exophoric reference to recover meaning related to objects which were ‘visually perceptible’ in the shared context. These externally-oriented cohesive relations contribute to the two-way orientation of the Montessori ensemble. This feature is augmented by the reference item *these* having the role of **theme** in the naming clause. The theme orients the clause, in this case, by anchoring the message to its material context. The pronoun *these* is also the **given**, or understood, information in the clause, while the name of the objects, *the folding cloths*, is the **new** information to which attention is directed, in language and gesture, and which is typically emphasised in the teacher’s intonation.

The role of naming, or labelling, incorporating the use of exophoric reference to tie external objects to language use, is a critical feature of Montessori ensembles in general. The role of naming is foreshadowed in the final array of folded cloths. In this array the embroidered lines and the folded cloths are tied to each other as instantiations of values derived from taxonomies drawn from the same region of educational knowledge (*axes of symmetry, plane geometric shapes*). The corresponding linguistic cohesive relation is the lexical relation of **hyponomy** (Halliday 2004a, pp. 575-576). The impression, or semantic outline which the array of folded cloths leaves with the child, will be transformed into generalisable educational concepts when the child learns the system of names through which these taxonomies
are realised in language. In Montessori ensembles names are taught using the three period lesson (See Section 6.7.1).

The deployment of textual meanings in the Montessori ensemble contributes to the interplay between local representation and abstract concept, the relation Butt (2004) has termed a critical abstraction. The ensemble augments the potential of local representation to leave an impression capable of supporting a critical abstraction because of the two-way (external-internal) orientation achieved in the relations which connect objects and language in the ensemble. After the child no longer uses the objects, the critical abstractions decontextualised in linguistic form have the potential to be recontextualised across a range of contexts.

Another function of the textual meanings of the Montessori ensemble is to give critical prominence to elements of the ensemble. The placement of the pronoun these at the beginning of the naming clause (These are the folding cloths.) gives the externally-oriented cohesive relation prominence. Similarly, placing the nominal group (the folding cloths) at the end of the clause gives the name of the ensemble prominence as new information. Comparable prominence in multimodal semantic units is achieved through a variety of compositional means, including framing and salience.

**Framing** is a feature which, in Montessori pedagogy, establishes a boundary between an ensemble and non-relevant features of the surroundings (Kress and van Leeuwen 1996; Unsworth 2001, pp. 109-110). Montessori ensembles are strongly framed when they are first presented, that is, there is a clear boundary established between the use of objects and language in the ensemble and unrelated objects and language in the surrounding context. The set of objects is framed compositionally by placing them on a clearly delineated surface, such as a small table top or a mat. Using spatial boundaries of this type regulates, in a concrete way, the field of a child’s attention. Similarly, the language of the ensemble is framed temporally and interpersonally by offers. For example, the presentation is initiated with an offer from the teacher such as Would you like to try this? and concluded with an offer such as Would you like a turn? After the initial presentation the framing of the ensemble is gradually weakened as the child gains independent control of the use of the objects, and the educational knowledge that this use encodes.
Salience is a feature which, in Montessori ensembles, foregrounds one element, or part of an element, against the background of the other elements (Kress and van Leeuwen 1996; Unsworth 2001, p. 111). Typically, this is achieved through variable contrasts set against a background of constant features. For example, the embroidered lines on the folding cloths have salience because their colour and texture contrasts with the colour and texture of the cloths and because the number and location of the lines vary. A comparable cohesive relation in language is antonymy, the relation between lexical items with opposite or contrasting meanings (Halliday 2004a, p. 574).

Salience can also be achieved by locating an object in the centre and/or foreground of the framed space of the ensemble. For example, placement of an opened cloth in a central position immediately in front of the teacher or child indicates salience, that is, the object is ready to be involved in a figure conflated with an interactive move. Placement of a folded cloth towards the more distant margin of the field reduces its salience until the remaining elements of the final array are completed, and the value of the folded cloth in the final array is revealed.

Giving salience to specific figures, elements and their parts is also achieved in a Montessori ensemble through the choreography of the teacher’s execution of the movements. This choreography includes exaggerated movements and momentary hesitations to frame movements. If the teacher wishes to guide the child’s attention to an element, or part of an element, because it is critical to the successful completion of a figure, or the activity sequence as a whole, the teacher will execute the movement slowly and deliberately with some exaggeration and then pause, perhaps mid-figure, to direct the child’s attention to the significance of this part. For example, the teacher might exaggerate the way the corner is grasped with thumb and forefinger and then pause mid-fold to highlight the exact matching of one corner to its opposite. In the Montessori tradition the element being framed in this way is called a point of interest. Points of interest provide the child with opportunities for reflection, and help, in both Séguin’s and Vygotsky’s terms, to regulate and intellectualise the child’s actions.

Cohesion between elements, and parts of elements, in the ensemble are typically realised linguistically as related sets of lexical items, a type of cohesion used to organise ideational meanings. The semantic ties between lexical items extend across clauses, weaving them together and giving a text its texture, or semantic unity
(Halliday and Hasan 1976). Educational knowledge, in its written form, is an instantiation of taxonomies of related lexical items. Typically, technical terms represent the categories and classification systems on which this type of knowledge is based. As the folding cloths exercise exemplifies, Montessori ensembles materialise these systems in sets of manipulable objects. Children have the opportunity to explore how these systems work by literally grasping and manipulating the knowledge in material form. As they progress, children are given names for the values materialised in the system. The semantic ties between values in the materialised systems correspond to the meanings which relate the names given to these values to the abstract systems of educational knowledge. It is in this way that the semantic unity of a Montessori ensemble leaves an outline into which the child can later fit the corresponding abstract knowledge.

This section has reviewed the textual meanings which tie the elements of a Montessori ensemble into a unified semantic unit. In particular, these meanings unify the two sub-units of the ensemble, the use of objects and the use of language, and contribute to the two-way (external↔internal) orientation of the ensemble. Significantly, textual meanings such as the cohesive relations of collocation and repetition, homophoric and exophoric reference, hyponomy and antonymy, as well as theme and information systems at clause level, and the compositional meanings achieved through framing and salience, contribute to the ensemble’s potential to capture, regulate and structure children’s attention, and, therefore, to the ensemble’s function as mediational means.

5.7 The structure of the Montessori ensemble

5.7.1 The stages of a Montessori ensemble

The provenance of the Montessori ensemble reveals that it has been designed much more deliberately and consciously than most situations realised through text in everyday life. As a result, not only the semantic categories, but also the structure through which a Montessori ensemble achieves its purpose will predictably be less variable in actual contexts of use than is the case for many other text-types. In this
section the structure of the Montessori ensemble text type is analysed in terms of the stages through which the purpose of the ensemble is achieved.

The identification of the stages of the Montessori ensemble which follows is based on the method described by Montessori (1964 [1909/1912]; 1965b [1916/1918]; 1965c [1916/1918]) and disseminated, to the present day, by the Association Montessori Internationale. The analysis itself is based on approaches for modelling text structure developed by Hasan (1985) and applied to the context of schooling, as described in, for example, Christie (1990), Christie and Martin (1997), Martin (1985; 1999) and Rothery (1996). The purpose of a Montessori ensemble is to mediate a particular region of educational knowledge in order to generate related developmental transitions. This purpose is achieved by guiding a child’s activity through three stages: the teacher’s presentation, then the child’s independent work and, finally, an extension stage.

The first stage of the ensemble is the teacher’s presentation, in which the teacher initiates the child’s interaction with the objects. In this stage the child imitates the teacher’s expert use of the objects. The child also participates in an accompanying naming lesson. The design of the naming lesson is accredited to Séguin by Montessori (1964 [1909/1912], pp. 177-178). The lesson, named for its three-part structure, is the three-period lesson.

The structure of the three-period lesson can be conceived of as a text-type in its own right. In the first period of the three-period lesson the teacher names and locates an aspect of educational knowledge materialised in an object. In the second period the teacher names the object and the child locates it and in the third period the child names and locates the object independently. Montessori (1964 [1909/1912], pp. 177-178) describes this progression in the following way: ‘the association of sensory perception with a name’, ‘the recognition of the object corresponding to the name’, and ‘the remembering of the name corresponding to the object’, foreshadowing Vygotsky’s model of the evolution of memory in ontogenesis. In Vygotsky’s terms, the objects operate as auxiliary external means for remembering elements of educational knowledge, which will later be internalised as logical concepts.
The first and second periods of the three-period lesson are repeated until the child can successfully achieve the third. The three-period lesson is embedded in the first stage of the Montessori ensemble. The first stage of the ensemble is repeated, with variations customised to the child, until the child can successfully sustain the second stage of the ensemble independently. The first stage can, therefore, be considered as potentially recursive.

The second stage of the ensemble is the *child’s independent work*, in which the role of the objects, as mediational means, is foregrounded. The second stage features *imitation* and *repetition*. Repetition, following Montessori (1964 [1912], p. 351) aids ‘the natural evolution of voluntary action’. It is in this stage, according to Montessori tradition, that learning takes place.

The first two stages of the ensemble are obligatory in the sense that without them the ensemble does not come into existence. Whether a child continues to the second stage depends on the child’s interest, a function of a sensitive period indicating a zone of proximal development. If a child does not continue to the second stage, a Montessori ensemble cannot be said to have been instantiated.

The *extension stage* of the ensemble links the child’s increasingly independent and decontextualised control of the educational knowledge, encoded in the use of the objects, to the wider use of this knowledge. This stage can be interpreted as the recontextualisation stage. The degree to which this stage is realised is at the discretion of the child in a Montessori classroom. The teacher’s task, as emphasised explicitly in Montessori teacher training, is to maximise the opportunities in the environment for the child to move into this stage.

A feature of the first two stages of the Montessori ensemble is the strong framing of boundaries in time and space, and the consequent regulation of the child’s attention. The boundaries in time and space of the third stage are more fluid and permeable. The stages are also distinguished by shifts in the nature of the social interaction, and by shifts in the mode of expression, in particular, the reduction in non-linguistic expression forms. From stage to stage, however, what remains constant is the region of educational knowledge being learned and the meaning relations which bring it into
The stages of the Montessori ensemble and related contextual variables are tabulated in Table 5.4.

<table>
<thead>
<tr>
<th>Stage of the ensemble</th>
<th>Variables of the situation type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
</tr>
<tr>
<td>Presentation of objects and language</td>
<td></td>
</tr>
<tr>
<td><strong>Objects in use</strong></td>
<td><strong>Language in use</strong></td>
</tr>
<tr>
<td>Presentation of objects</td>
<td>Three-period language lesson</td>
</tr>
<tr>
<td>The teacher manipulates the objects and the child imitates.</td>
<td>Period 1: The teacher names and indicates.</td>
</tr>
<tr>
<td></td>
<td>Period 2: The teacher names and the child indicates.</td>
</tr>
<tr>
<td></td>
<td>Period 3: The child names and indicates.</td>
</tr>
<tr>
<td>All elements of this stage are obligatory and potentially recursive. The temporal and spatial location of the presentation is strongly framed.</td>
<td></td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td>Independent work</td>
<td></td>
</tr>
<tr>
<td>The child uses the objects and the language independently. The teacher observes the child’s use. If the child’s use varies from the presentation in a way which does not reflect the purpose of the presentation, the teacher at a later point re-presents the use of the objects and/or the language, ie returns to Stage 1. This stage is obligatory. The temporal and spatial location of the object use and language use remains strongly framed.</td>
<td></td>
</tr>
<tr>
<td><strong>Stage 3</strong></td>
<td></td>
</tr>
<tr>
<td>Extension into other contexts of use</td>
<td></td>
</tr>
<tr>
<td>The child recontextualises the language used in Stages 1 and 2, ie uses the language meaningfully in contexts separate from the use of the objects. This stage is at the child’s discretion. The teacher, however, ensures the environment includes opportunities for recontextualisation. For example, if the child is using the word ‘triangle’ in the context of using Montessori objects, the teacher ensures there are triangular shapes in the environment, including perhaps triangular table tops, triangular cut outs for art projects, table napkins folded into triangles. The temporal and spatial location of this stage is increasingly fluid and permeable.</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.4: The structure of a Montessori ensemble
5.7.2 The Montessori ensemble: analysing designed microgenesis

Montessori ensembles are interpreted in this study as designed microgenetic processes. The meaning potential of the ensembles is handed over explicitly, with great attention to detail, to Montessori teachers during their training, and realised through choreographed interactions with children in Montessori classrooms. The Montessori ensemble, thus, contrasts with the everyday micro-interactions children share spontaneously with caregivers and others in family and community contexts.

Because Montessori teachers are given detailed guidelines about the way objects and language are to be used in interaction with children during the first stage of the ensemble, variations in instances of this stage are likely to be comparatively constrained, and, therefore, can be predicted in some detail. Instantiations of the second stage will necessarily be less constrained and only predictable to a limited degree. Predicting instances of the third stage is beyond the scope of this study, although, arguably, close investigation of the way this stage is instantiated in actual contexts of use is of critical importance to an evaluation of Montessori education.

The collection and analysis of data recording children’s actual interaction with the objects across the three stages of the ensemble is a necessary extension of this study, and a necessary step towards, not only refining and enhancing the delivery of Montessori programs into the future, but also steering Montessori advocacy towards an evidence-based approach. This is particularly true of the third stage of the ensemble. It is through the third stage that the learning generated by the first two stages can be evaluated, but, in the Montessori tradition, this stage tends to be described in anecdote only, a characteristic of the oral tradition established by Montessori herself.

Social semiotic studies of children’s everyday interactions offer methodological approaches, which may prove valuable in the analysis of data collected in Montessori classrooms. While the stages of the Montessori ensemble described above will be adequate for the purposes of this study, it is probable that actual data will demand a more nuanced approach to enable, for example, the segmentation of the stages of the ensemble into smaller phases comparable to the rhetorical units proposed by Cloran

Social semiotic studies linking children’s everyday interactions at home with school learning include, for example, studies with a focus on semantic variation by Cloran (1999), Hasan (1996a, 1996b, 2005 [1986], 2005 [2002], 2005 [2002], Hasan and Cloran (1990) and Williams (2001), and the study based on lexicogrammatical description by Painter (1999a; 1999b). These studies demonstrate that children’s everyday interactions are as much contexts for learning as interactions at school and that there is an association between the kind of learning experienced at home and in the community, and the kind of learning achieved at school. The nature of the association, as Cloran (1999, p. 31) argues, ‘is likely to be different in the experience of different sectors of society’. An exploration of the nature of this association includes examining the question of how educational knowledge is recontextualised from the fields of its production in the wider society outside the school to its reproduction in the school. In order to consider this question, and its relation to the Montessori objects and their use, the final section of this chapter selectively reviews analytic tools proposed by Basil Bernstein.

‘Bernstein’s theory of the social’, following Hasan (2005c, pp. 150-155), provides another perspective on semiotic mediation, a perspective which foregrounds the role of semiotic mediation in ‘the internalisation of the social structure’.

### 5.8 The pedagogic device: a social view of cultural reproduction

#### 5.8.1 A grammar of pedagogy

Just as language imposes order and centres of relevance on an otherwise undifferentiated mass of potential thought and experience, pedagogy imposes order and centres of relevance on the otherwise undifferentiated mass of potential knowledge. Language has grammar to organise meaning into structures which can then be given reality in an expression form and pedagogy activates a system of principles through which knowledge is given reality in learning contexts. It is just such a system of principles that Bernstein (1990, 2000) has articulated in his concept of the pedagogic device, a concept central to his sociology of pedagogy.
Bernstein’s sociology of pedagogy foregrounds ‘the dialectic of the social and the semiotic’ (Hasan 2005a, p. 33). For this reason, Bernstein’s sociology has the potential to add a further dimension to Vygotsky’s description of the role of semiotic mediation in the development of higher forms of human consciousness. Vygotsky’s description does not account, in any detail, for the role of diverse social contexts in shaping consciousness during ontogenesis, nor does it account for the way educational knowledge is given reality in learning contexts. As Hasan (2005 [1992], 2005 [1995], 2005c) argues, Vygotsky’s framework not only needs the more sophisticated theory of language provided by systemic functional linguistics, but ‘it also needs a more sophisticated theory of social organization’ such as that proposed by Bernstein. This more sophisticated theory is exemplified in the concept of the pedagogic device, which Bernstein (2000, p. 37) describes as ‘a symbolic regulator of consciousness’.

With the pedagogic device Bernstein provides a system of three interrelated principles for examining how knowledge is recontextualised from the fields of its production, in the wider culture outside the school, to its reproduction in the school, by means of pedagogic discourse that constructs the relationship between teachers and learners. On the basis of these three principles, the following sections will examine the fields from which the educational knowledge comprising Montessori pedagogy is derived, the ways in which this knowledge is recontextualised in Montessori pedagogic discourse, and the ways it is realised as Montessori practice. Inevitably, this examination will draw attention to how children from different social backgrounds might respond to this type of recontextualisation, although it is beyond the scope of this study to do more than to suggest directions for future research in this area.

### 5.8.2 Educational knowledge and Montessori pedagogic discourse

The first principle through which the pedagogic device regulates consciousness relates to *distributive rules*, rules which govern the relations between knowledge, power, different social groups and consciousness.

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8 See also Wertsch, Tulviste and Hagstrom (1993).
Two types of knowledge are distinguished by Bernstein (2000, pp. 156-160): everyday commonsense knowledge and official educational knowledge. Everyone potentially has access to everyday knowledge, which is learned in local settings through spoken language. Its meanings are habitual and dependent on the context in which they are made and are oriented to building personal relationships. The meanings of educational knowledge, on the other hand, are specialised and abstract, organised in hierarchical systems and independent of the immediate context. The abstract, specialised meanings of educational knowledge intervene between the material world and consciousness, and extend beyond the immediate material context in time and space.

Official educational knowledge is described by Bernstein (2000, p. 114) as having two facets: the thinkable and the unthinkable, or ‘the possibility of new knowledge’. Distributive rules control access to thinkable and unthinkable forms of consciousness. Thinkable knowledge is accessed through official educational contexts such as schools. The unthinkable is controlled in simple societies by religions, while in more complex societies it is controlled by institutions such as universities. Variation in access to these two facets of educational knowledge is modelled by Bernstein in terms of distributive rules.

Montessori’s orientation to thinkable and unthinkable educational knowledge is, as would be expected, realised in the discourse of Montessori pedagogy. First, as an academic, Montessori worked in a field where production of new knowledge was a possibility. Second, the organisation of educational knowledge in the universities of her era reflected the medieval university structure, a structure in which knowledge was grouped as the Trivium of logic, grammar and rhetoric and the Quadrivium of astronomy, music, geometry and arithmetic. In other words, the organisation of knowledge was based on the distinction between linguistic knowledge (the Trivium) and abstract knowledge of the physical world and mathematics (the Quadrivium). This organisation is described by Bernstein (2000, pp. 8-9) as the source of a specific European consciousness, a consciousness which pervades the discourse of Montessori pedagogy. Vygotsky’s discussion of scientific, or academic, concepts has its foundation in the same consciousness.

The distinction between the disciplines is clearly delineated in Montessori pedagogy. In Bernstein’s terms, it is strongly classified. A strongly classified model of
knowledge also distinguishes clearly between everyday and educational knowledge (Bernstein 2000, p. 10).

5.8.3 Recontextualising knowledge in Montessori pedagogy

The second principle through which the pedagogic device regulates consciousness relates to recontextualising rules, the rules which construct pedagogic discourse from official educational knowledge. These rules determine what is taught and how it is taught. The discourses of official knowledge are recontextualised, often through the offices of state institutions, by selecting and re-ordering the content, and relocating it from the context in which it was produced (for example, the university) into pedagogic discourse.

In the case of Montessori pedagogy, the agent who initially recontextualised the official discourse is a single individual, Montessori herself. The recontextualisation of her orientation to official knowledge, and to the possibility of new knowledge, into the discourse of her pedagogy was undertaken without the direct influence of institutions such as state education departments. It was also undertaken with a belief in the capacity of young children of all social backgrounds to access these types of knowledge well beyond the usual expectations of state institutions.

Embedded into pedagogic discourse, Bernstein (2000, pp. 31-32) claims, are two discourses. These are a discourse relating to the content, instructional discourse, and a discourse relating to the social order through which the content is delivered, regulative discourse.

The content Montessori recontextualised into the instructional discourse of her pedagogy includes not only official academic knowledge, reflecting the organisation of medieval universities, but also everyday manual skills, typically learned at home, and the expressive skills of the creative arts and crafts. Everyday knowledge is described by Bernstein (2000, pp. 155-174) as being organised horizontally in segments and transmitted using horizontal discourse. This transmission is typically tacit, with ‘showing’ or ‘modelling’ preceding ‘doing’ (p. 169), a form of transmission characteristic of the entry level Montessori practical life exercises. In contrast, vertical discourse, the discourse of educational knowledge, is organised hierarchically and
systematically. It is this type of discourse which is the developmental goal of Montessori pedagogy.\footnote{Confusion about the location of horizontal and vertical discourses on Montessori developmental pathways may underlie some of the less effective implementations of the pedagogy in recent times, particularly where Montessori pedagogy is implemented as a variation of progressive pedagogy. Bernstein (2000, pp. 169-170) observes that, in contemporary education for reasons of accessibility and equity, horizontal discourse is often inserted into vertical discourse, but with perhaps less than equitable results. Less effective implementation of Montessori pedagogy may result from the retention of horizontal discourse at points on Montessori developmental pathways where the vertical discourse of educational knowledge more effectively should have taken over. Bernstein’s descriptive categories have the potential to guide analysis of data collected from a variety of Montessori contexts in order to examine this possibility.}

Montessori instructional discourse establishes clear boundaries, or strong classification, between different areas of the content, with the result, as Bernstein (2000, p. 11) predicts, that teaching and learning progress from concrete experience to more abstract principles. When children begin to control the abstract principles, access to new knowledge becomes possible, and classification, in other words, the boundaries between the areas of content, has the potential to be weakened.

The delivery of the content in pedagogic contexts, following Bernstein, is based on rules which create a discourse of social order, a regulative discourse which dominates the instructional discourse. Regulative discourse is linked by Bernstein (2000, p. 8) with the linguistic knowledge of the Trivium. This discourse emerges from the social order of a Montessori classroom in a distinctive way. Montessori pedagogy is based on children’s activity, which is freely chosen in order to maximise learning in the context of a sensitive period, a period of heightened interest which indicates a zone of proximal development. This activity, although freely chosen, is limited to using objects in a way that reflects their purpose, a use learnt in the Montessori ensemble, without disturbing the work of other students. Rules such as these, which create social order, are analysed in Bernstein’s framework through the concept of framing.

The variable framing concerns who controls the pedagogic discourse. It is a concept not to be confused with the compositional variable discussed in 5.6.3 above, although compositional framing and the framing of pedagogic discourse sometimes conflate in interesting ways in Montessori pedagogy. This is because the material and visual system of framing, as applied in Montessori pedagogy, also has a regulative role, by limiting the field of shared attention. The framing of the children’s activity in
Montessori pedagogy is centred on a communal authority. It is distributed to individuals on the basis of knowledge and self-mastery and is realised in practical action and language, which are explicitly modelled and taught by the teacher. Within the structure of the Montessori ensemble, control of the discourse is a shifting phenomenon. In the first stage of an ensemble the teacher’s control strongly frames the discourse, but this framing weakens as the ensemble unfolds, and as the child’s mastery and knowledge increases. The shifting quality of the classification and framing in Montessori pedagogy can be compared with proposals for ‘genre-based’ literacy pedagogy. The designers of this pedagogy, drawing on Bernstein’s work, introduced ‘waves of weak and strong classification and framing as appropriate to different stages of [the] pedagogic cycle’ (Martin 1999, p. 143).

5.8.4 Montessori pedagogy as an ‘invisible’ visible pedagogy

The third principle through which the pedagogic device regulates consciousness relates to evaluative rules, the rules which transform pedagogic discourse (instructional embedded in regulative) into practice. This transformation specifies the discourse in terms of text and locations in time and space, bringing into relation a child’s age, the content being taught and the context. In Montessori practice how this transformation takes place is specified in great detail, constituting a visible pedagogy in Bernstein’s terms. These specifications are an expression of Montessori’s modelling of development as a series of four rhythmic cycles, or ‘planes’, each cycle roughly mapped onto a six-year segment of the child’s life (See Section 6.2).

Strong classification and strong framing in Bernstein’s terms are markers of a visible pedagogy, a pedagogy in which different areas of content and the social relations between teacher and student are clearly specified and explicit. In contrast, in an invisible pedagogy, neither the classification of knowledge nor the framing of social relations is obvious.

In the case of invisible pedagogic practice it is as if the pupil is the author of the practice and even the authority, whereas in the case of visible practices it is clearly the teacher who is the author and authority (Bernstein 2000, p. 110).
Bernstein argues that, as the twentieth century unfolded, the strong classification characteristic of European knowledge domains in the nineteenth century weakened, especially in pedagogic contexts. The origin of this weakening in schools is, ironically, linked to Montessori. An English Montessori society, set up in 1914, evolved into the New Education Foundation (NEF) by 1920. As portrayed in an account by Jenkins (1989, p. 46), over the following two decades the New Education Foundation expanded into an influential international movement promoting child-centred pedagogy aiming to free the child from traditional, authoritarian pedagogies, and to contribute to a new productive and peaceful world order based on democratic, internationalist principles, a project which became more urgent as nationalism, totalitarianism and war again threatened Europe in the 1930s. The influence of this movement contributed to the weakening of the classification of knowledge and the framing of social relations in what is now called progressive education. Progressive education, thus, promotes an invisible pedagogy.

Although Montessori continued to be linked with the NEF, the Montessori objects and their use were not considered by influential members of the foundation to be ‘creative’ (Jenkins 1989, p. 129), no doubt a consequence of the highly ‘visible pedagogy’ they embodied. Arguably, for this reason, Montessori practice became marginalised from the influence the NEF came to have on pedagogic practice in general, specifically the promotion of invisible pedagogy.10

Invisible pedagogy can pose problems for some children, because as Hasan (2005a, p. 29) writes, ‘the rules of the game are not transparent except to those who have experience of this particular form of communicative strategy’. If everyday interactions

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10 Jenkins (1989, p. 127) describes the editorials in the NEF journal The New Era, as ‘powerfully written with a missionary zeal ... almost a religious conviction, a way of life’, a style which matches Montessori’s writing as it appears in English. It may be that after 1920 Montessori’s publications were largely written for the NEF audience. It is interesting to speculate whether the influence of the NEF and the pressure to deliver an invisible pedagogy can be linked to the lack of published accounts of the details of Montessori practice after 1920. An exception is the Spanish, and later Italian, edition of the Montessori arithmetic pedagogy, a very visible pedagogy indeed (Montessori 1971 [1934]), while the bulk of Montessori’s comprehensive and detailed visible pedagogy remains largely unpublished and continues to be transmitted through spoken lecture.

Grazzini (1996, p. 233n19) provides interesting detail about Montessori’s relationship with the NEF, complementing the account by Jenkins (1989), and adding more from the Montessori perspective. For example, the first International Montessori Congress was held in 1929 in Elsinore as part of the World Congress of New Education. While there are no longer NEF congresses, international Montessori congresses continue, for example, the 25th congress was held in Sydney in 2005. Further unravelling the relation between Montessori and the NEF would provide interesting insights into the subsequent evolution and influence of both.
at home and in the community do not give children experience with the communicative strategies needed to access invisible pedagogy, these children are at a disadvantage.

When Montessori first recontextualised educational knowledge in her pedagogy, it was for developmentally-delayed children and slum children, for whom the communication strategies needed to access invisible pedagogy could not be assumed. The shifting relations between strong and weak classification and framing, and the resulting combination of visible and invisible practices, which give Montessori pedagogy its distinctive character, appear to have emerged as a response to the needs of such children. The reported success these children achieved against traditional benchmarks, and subsequent reported achievements of children from a range of social and cultural contexts, suggest Montessori pedagogy may provide a common gateway for children of varied backgrounds into the mastery of educational knowledge organised in the European way. While it is beyond the scope of the present study to follow this line of enquiry, analysing what is distinctive about Montessori pedagogy, the Montessori objects and their use, may indicate the direction such a line of enquiry might take.

5.9 The meta-analytic framework: a review

This chapter has extended the analytic framework presented in Chapter 4 using analytic tools selected from the field of social semiotics. These tools have been used to analyse the semiotic qualities of the Montessori objects and their use. Furthermore, a theory of social organisation has been included in order to account for the distinctive way educational knowledge is recontextualised into the discourse of Montessori pedagogy.

In the chapters which follow, this integrated meta-analytic framework will be applied to specific elements of Montessori pedagogy in order to draw out indexical qualities of Montessori practice.