

10 The Development of Children's Conceptual Relation to the World, with a Focus on Concept Formation in Preschool Children's Activity

Two of Vygotsky's (1997) central theoretical points are that cultural-historically developed tools mediate the child's relation to the world and that the competence to handle such tools is acquired in social settings through guidance from others. His theory of concept formation for preschoolers, schoolchildren, and adolescents explains how the practice of institutional activities influences children's concept formation (Vygotsky, 1987, 1998a). Small children participate in the everyday activities at home; schoolchildren meet the academic world in school, which he points out as a necessity for schoolchildren's development of scientific concepts; and adolescents get acquainted with the activities in work life, a necessity for their development of dialectical concepts.

Vygotsky describes how very young children appropriate concepts of tools and objects through interaction with their caregivers and, as an example, he exemplifies this with how a child learns to use a spoon in interaction with his caregivers (Kravtsov & Berezlichkaya, 1999). In his theory, Vygotsky characterizes small children's and preschool children's concepts as everyday concepts developed spontaneously in collaboration with others through everyday activities. He contrasts these concepts to schoolchildren's concepts, which he characterizes as scientifically developed through systematic school instruction.

Although Vygotsky describes the concept learning of preschool children as inscribed in the social practice of everyday activities, what he primarily draws on when describing preschool children's concept formation is an experiment with the double-stimulation method (Vygotsky, 1987 p. 130ff). In this experiment, children's task is to sort blocks that vary in form, size, and color, gradually finding the sorting principle because a meaningless label is attached to the bottom of each block that is turned over each time the child has chosen one. The two types of stimuli in the double stimulation method are designed to be as far as possible from everyday practice. Vygotsky characterizes four steps

in the small child's concept formation based on the results of this experiment.

As Davydov (1998) notes, Vygotsky's experiment has led to the misunderstanding that the child's appropriation of everyday concepts is a natural process and not a cultural process. This is easy to understand because this experiment dominates the description in one of Vygotsky's first translated and perhaps best-known works, *Thought and Language* (1962).¹ Instead, as Davydov points out, Vygotsky's theory about concept formation and the formation of individual consciousness has to be understood within the following process: "collective activity-culture-the ideal-sign or symbol-individual consciousness" (Davydov, 1998, pp. 92–93).²

Systematic analysis of small children's and preschool children's concept development within everyday activities at home and in the community is an area that must be developed in relation to Vygotsky's theory. Vygotsky was aware of this and suggests that the domain of preschool children's concept formation must be one of the areas for future research:

We know that the relationship between instruction and development differs with each developmental stage – we will merely assert that future researchers must remember that the unique character of the child's spontaneous concept is entirely dependent on the relationship between instruction and development in preschool age, we will refer to this as a transitional spontaneous-reactive form of instruction since it constitutes a bridge between the spontaneous instruction characteristic of early childhood and the reactive instruction common to the school age.

(Vygotsky, 1987, p. 238)

In this article, I will build on Vygotsky's ideas of how collective activity is the foundation for children's concept formation – and explore what these ideas about the interconnection between the child's conceptual development in different developmental periods, in different institutional practice traditions, and in knowledge traditions mean for small children's and preschool children's concept formation.

VYGOTSKY'S THEORY ABOUT PRESCHOOL AND SCHOOLCHILDREN'S CONCEPT FORMATION

Vygotsky's characterization of the development of small children's and preschool children's concept formation from the results of the double-stimulation experiment can lead to the misunderstanding that the visual

¹ This title was later translated as *Thinking and Speech* (1987).

² See also, Davydov, 1993, pp. 14–15.

world is the foundation of the child's everyday concepts and that concepts reflect the objective characteristics of the world,³ an interpretation of concepts that Iljenkov points out is problematic (Iljenkov, 1977, p. 83). Rather, concepts should be understood as the idealized activity that is expressed in all objects as results of human activity (Iljenkov, 1977, p. 92). This implies that by perceiving, handling, or acting in relation to objects, a person relates to the way previous generations have perceived, handled, and acted with these objects.

Vygotsky saw everyday concepts as connected to a child's activity in everyday settings and the scientific concepts as connected to a child's activity in settings with systematic symbolic systems that the child becomes acquainted with in school. The difference between everyday and scientific concepts can be found in the spontaneousness or, respectively, consciousness of the child's conceptual competence.

According to Vygotsky, the difference between these two conceptual modes⁴ lies both in the difference in structure and content and in the processes by which they are acquired. For the child, everyday concepts are connected to family and community life and are appropriated through the child's experience with objects outside an integrated system of knowledge. The scientific concepts are about academic matters and are appropriated in relation to other concepts within a system of knowledge. The appropriation of concepts within a system of knowledge gives the child a possibility to use them consciously and intentionally. The various subjects in school are the systems within which the child can come to act consciously and intentionally with concepts. Vygotsky shows that there is both a difference in the learning process and in the developmental process during the child's appropriation of the two conceptual modes.

Learning

For the preschool child, the learning of everyday concepts is spontaneous and takes the form of imitation in a broad sense which means imitating what a more competent person demonstrates in social situations. In school-age children, the learning activity is based on conscious

³ Vygotsky theory of concept formation is only outlined in *Thinking and Speech* (*The Collected Works of L. S. Vygotsky. Volume 1*, 1987). The theory is developed further in his writings about child development (*The Collected Works of L. S. Vygotsky. Volume 6*, 1997).

⁴ I use conceptual modes instead of type, because the spontaneous and scientific concepts can be seen as a differentiation of a person's appropriation of concepts within a conceptual domain.

voluntary orientation to instruction based on linguistic communication within the different subjects in school. Vygotsky writes:

The strength of the scientific concepts lies in the higher characteristics of concepts, in the consciousness awareness and volition. In contrast this is the weakness in the child's everyday concepts. The strength of everyday concepts lies in spontaneous, situationally meaningful concrete applications, that is, in the sphere of experience and the empirical. The development of scientific concepts begins in the domain of conscious awareness and volition. It grows downwards into the domain of the concrete, into the domain of personal experience. In contrast, the development of spontaneous concepts begins in the domain of the concrete and empirical. It moves toward the higher characteristics of concepts, toward conscious awareness and volition. The link between these two lines of development reflects their true nature. This is the link of the zone of proximal and actual development. (Vygotsky, 1987, p. 220)

Development

From a developmental perspective of concept formation, Vygotsky has associated everyday concepts with home and community life and scientific concepts with school life. These two modes of concept formation are also intertwined according to Vygotsky. These two modes of concept formation are preconditions of each other. Scientific concepts build on everyday concepts, but they also qualify the person's everyday concepts. It is only when the scientific concepts become integrated with the child's everyday concepts that they become a competence in the child's life outside the classroom. These two modes of conceptual activity are tightly connected processes. In early childhood, everyday concept formation dominates over scientific concept formation, but changes around school age when the scientific concept formation dominates and thereby enriches the child's everyday concepts.

The difference in age, that is, from preschool to school age, is a difference in how the psychological functions relate to each other. Vygotsky's main point is that a person's psychological functioning is a unitary process, so when a developmental change takes place in one function, such as the child's development of concepts, this will influence all the other functions and change the child's conscious relation to the world – perception, logical memory, intentional attention, abstract thinking, and scientific imagination (Vygotsky, 1987, pp. 189, 208).

Vygotsky uses the double-stimulation experiment to outline steps in the development of a structure of small children's and preschool children's everyday concepts. He outlines the following four structural steps:

syncretic concepts (which are organized by what factors and entities are together in a situation); complexes (which are organized by similarities that are not consistent, but may vary from object to object, or connect different objects to a core object based on associations only of the similarity between one object and the core object); preconcepts (which are organized by abstracted similarities between all objects); and with real concepts that are logically defined (organized by abstract similarities and differentiated into a categorical system). Vygotsky describes it this way:

Each structure of generalization (i.e., syncretic, complexes, preconcepts, and concepts) corresponds with a specific system of generality and specific types of relationship of generality between general and specific concepts. Each structure of generalization has a characteristic degree of unity, a characteristic degree of abstractness or concreteness, and characteristic thought operations associated with a given level of development of word meaning.

An example may help clarify this point. In our experiments, a child who rarely spoke learned the meanings of five words (i.e., chair, table, cabinet, couch, bookcase) with no particular difficulty. He clearly would have been able to extend the series. However he could not learn the word "furniture". Though the child could easily learn any word from the series of subordinate concepts, this more general word was impossible for him. Learning the word "furniture" represented something more than the addition of a sixth word to the five that the child had already mastered. It represented the mastery of the relationship of generality. The mastery of the word "furniture" represented the mastery of the child's first higher concept, a concept that would include a series of more specific subordinate concepts. This meant that the child would have to master a new type of relationship between concepts, a vertical rather than a horizontal relationship. (Vygotsky, 1987, p. 225)

This example shows the difference between logical concepts and the three other structural forms, but it also shows how Vygotsky saw the ideal conceptual system that the child will acquire at school age to be dominated by the empirical knowledge form. Other forms of knowledge used as foundations for children's concept formation have been formulated by Davydov (1972/1990, 1988) and Bruner (1986) as theoretical-dialectical and narrative, respectively.⁵

In order to explain why preschool children's everyday concept formation is not a "natural" process and why "everyday concept formation" can lead to different conceptual competencies depending of the type of

⁵ Vygotsky's research (Vygotsky, 1998a) about concept formation in late school age and the youth period seems to build on aspects of the theoretical-dialectical knowledge traditions as specified by Davydov (1972/1990).

knowledge form that characterizes the everyday practice in the institution where the child is learning, I must sketch Davydov and Bruner's characterization of different knowledge forms.

ARTIFACTS, TYPES OF KNOWLEDGE, AND SOCIAL PRACTICE

The philosophical work of Evald Iljenkov, Marx Wartofsky, and Uffe Juul Jensen has made it possible to formulate quite clearly that knowledge about practice and traditions is not only personal but transcends the single person and becomes ideals in the form of collective societal knowledge. Iljenkov (1977, p. 92) formulates this principle of collective concepts: "The ideal form of a thing is not the form of the thing 'in itself,' but a form of social human life activity regarded as '*the form of a thing.*'"

A concept in this sense always combines the idealized practice with the humanly constructed objects. This kind of knowledge is developed through the societal practice of solving pressing institutional and societal problems (Jensen, 1986), whereby both knowledge as "tools" and procedures are developed. When knowledge procedures transcend the specific institutional practice and become generalized and used in other types of institutions as is the case for empirical, narrative, and theoretical knowledge, I have called this *societal knowledge* (Hedegaard, 2002)⁶ Davydov's distinction between empirical and theoretical knowledge forms can then be seen as different forms of societal knowledge. Bruner's differentiation between narrative and empirical knowledge can also be characterized as societal forms of knowledge, where Bruner and Davydov's description of empirical knowledge refers to the same form of knowledge.

Empirical knowledge is reflected in abstract concepts that are attained through observation, description, classification, and quantification (Bruner, Goodnow, & Austin, 1956; Davydov, 1972/1990, 1988). This form of knowledge presupposes that the world can be represented correctly, and correct representation gives the possibility for accurate measurement, creating factual knowledge. Empirical knowledge presupposes the use of categories for its representation. Similarities and differences are recognized, which is the foundation for the construction of categories. Categories can be organized hierarchically into super- and subcategories, and hierarchical systems and networks can be created.

⁶ Practice, form, and content cannot be completely separated. My aim here is to illustrate how generalization of practice and content in a certain way are connected to form, and what I do in this chapter is to focus on the aspect of form.

Paradigms of classical logic are the methods for combining knowledge categories.

Empirical knowledge (or factual knowledge) influences a great deal of everyday life for people in Western industrialized societies and characterizes the educational activity of most schools today (Cole, in Davydov & Markova, 1993).

Narrative knowledge may be characterized by (a) changeableness in intentions, (b) possible mutual perspectives and goals which interact, and (c) involvement of feelings and emotions (Bruner, 1986, pp. 16–25). This kind of knowledge is created by transcending the situated descriptions and relating them to general themes of human life. Bruner describes the method as *presupposition*, the creation of implicit rather than explicit meaning; *subjectification*, the depiction of reality through a personal view; and *multiple perspectives*, beholding the world not universally but simultaneously through different views that each express some part of (Bruner, 1986, pp. 25–26). Examples of narrative knowledge are epic descriptions, novels, comedy, drama, and poetry. Narrative knowledge and thinking forms can also be seen in “folk theories” about daily life events.

Narrative knowledge characterizes the communication in a child’s daily life at home and among peers. Educational theories that prefer dialogue as the primary pedagogic form can be seen as promoting narrative knowledge and dialogical thinking.

Theoretical – dialectical knowledge is related two forms of knowledge in systems where one type of knowledge is complementary to the other so that if a change takes place it will be reflected in all the central relations of the system. This kind of knowledge can be found in theories and models that can be used to understand events and situations and to organize and experiment with actions (concrete life activities). This type of knowledge can also be found in all professional work (e.g., engineering, city planning, professional cooking or nursing, steering a ship, dress designing), where persons have a theory and models for their work.

A core model is a central method of modeling within the theoretical knowledge tradition. Core models contain oppositions and complementary poles within a subject-matter area. Davydov names these form of models *germ-cells* (Davydov, 1972/1990; Davydov et al., 1982). For example, in biology a germ-cell is the relationship between *organism* and *context*. This relationship can easily be recognized in all specific biological matters. Such a core relation can be extended by a new relationship, which influences and changes the meaning of the initial concepts (see Hedegaard, 1990). In psychology, the relationship between subject and object can be seen as a germ-cell, where the various parts in this relationship define each other. In Vygotsky’s theory this relationship

is extended and mediated by the concept of tool, so that the "object" always has to be understood within its relation to tools and artifacts; the same is true for the "subject," who, through this relation, becomes not only active, but active within the human mode of relating to the world (Vygotsky, 1997, ch. 5).

A child is born into a world of artifacts that includes different forms of knowledge. The upbringing of a child should lead the child to appropriate competences with these artifacts that can satisfy both the child's own needs and the societal expectations of how a child should contribute to societal life at various ages. Different knowledge systems and forms of knowledge can be seen as collective conceptual knowledge. This must be differentiated from a person's conceptual knowledge. Therefore, I will now use *knowledge* to discuss collective conceptual knowledge and *concepts* to discuss personal conceptual competence. Collective knowledge and personal concepts meet and develop through a person's activity in institutional practice.

Figure 10.1 illustrates the relationships between collective (societal) knowledge (including various types), institutional practice (everyday, academic, and work practice), and personal conceptual competences. The various institutions depicted in Figure 10.1 illustrate that children can appropriate conceptual competences that are related to different practices and different knowledge systems. However, it is not the case that the knowledge systems are narrative at home, empirical in school, and theoretical at work. Institutional practice leads to increased knowledge, but this can find expression in all three forms of knowledge depending of the traditions for representing knowledge in a given institution.

Vygotsky's and Davydov's theories of concept formation are two different perspectives on concept formation in practice – a societal one and a personal one. Participation in an institutional practice leads to a child's appropriation of societal knowledge, thereby acquiring conceptual competence within specific content areas and motives that orient the child in specific ways toward these areas.

How the same type of institutional activity can be qualitatively different and result in children's appropriation of different forms of concepts even for small children and preschool children will be the next topic in this chapter.

INSTITUTIONAL PRACTICE AS THE FOUNDATION FOR DEVELOPMENT OF PERSONAL KNOWLEDGE

Children first meet concepts in family and community practice, and, through participation in this practice, they appropriate societal or collective knowledge. This collective knowledge is transformed into personal

Societal Perspective		Personal Perspective	
Cultural Practice Traditions	Developmental Changes	Competence	Leading Motives
Maternity ward/ home	Crises of the newborn/infancy	Starting acquiring competence with primary artifacts Experimentation with perception	Intentional orientation toward the caregiver (attachment)
Home	Crises at age 1/ early childhood	Action representation (enactive) Competence with own body (walking) Experimentation with objects	Intentional orientation to the object and spatial world (object play)
Kindergarten	Crises at age 3/ preschool age	Imaginary representation (iconic) Beginning competence with secondary artifact Experimentation with words, objects and rules in play	Orientation toward other children and to the adult world (role play)
Primary school	Crises at age 7/ school age	Symbolic representation Beginning competence with connected system of knowledge – tertiary artifacts Experimentation with imaginations and symbols within systems	Orientation toward mastering the adult world and to academic learning
Secondary school	Crises at age 13/ age of puberty	Competence with tertiary artifact Experimentation with representational systems	Orientation to youth life and friends
Higher education/ work	Crises at age 17/ adolescence	Work profession	Societal orientation

FIGURE 10.1. Developmental stages from a societal and a personal perspective.

conceptual competencies through the child's activity. These personal competencies continue to develop as the child is introduced to new practices in school, at home, and in the community. How children's personal conceptual competencies from home and community life will

be related to academic knowledge and work knowledge depends on how the situational conditions encourage him or her to develop motives for using conceptual competencies in these new situations.

I will draw on Katherine Nelson's (1974, 1977a, 1977b) research of small children's concept formation, especially her analyses of the interchange between the small child and caregivers to illustrate how this activity can lead to children's appropriation of conceptual competencies. In order to be able to take one step further than Nelson, who presupposes the child's perceptual competence in her theorizing about small children's concept formation, I will draw on Wartofsky's (1973/1979) philosophical analyses of the perception of objects as an activity that is mediated by artifacts, where these artifacts are seen as objectifications of human needs and intentions.⁷ Wartofsky's formulation of the embeddedness of human intentions and needs in objects is in line with Iljenkov's ideas about concepts as collective ideals, but Wartofsky takes an important step further because, in his formulations, he integrates the emotional and intentional aspects in the child's perception of objects. Wartofsky's theory has shed light on the child's concept learning as it is interwoven with the child's intentional orientation and motives from the very beginning of life.

Furthermore, in order to transcend the conception of young and preschool children as using only one ideal form of concepts, namely, the empirical one, I will use Vygotsky's theory of children's development in play. Vygotsky has stressed the importance of play for children's cognitive development. His description of children's acquisition of symbols and rules through play activity will be important. In small children's and preschool children's play one can see how their early forms of conceptual representation can reflect both narrative and dialectical theoretical knowledge forms.

In the last section, I will outline a developmental perspective that implies qualitative developmental changes in children's concept formation related to qualitative changes in institutional practice and the forms of knowledge that dominate an institution.

This theoretical analysis of preschool children's concept formation will be illustrated by a project analyzing preschool children's play with different types of play material aimed at promoting concept formation. This illustration focuses on both the support and the restrictions that educational play materials give to children's concept learning.

⁷ Wartofsky writes, "I take these artefacts" (tools and language) to be the objectifications of human needs and intentions that is, as *already* invested with cognitive and affective content.

KATHERINE NELSON'S THEORY OF INFANTS' AND SMALL
CHILDREN'S CONCEPT FORMATION

Katherine Nelson (1995) has criticized Vygotsky's characterization of everyday concept learning as being unsystematical in contrast to scientific concept learning. She argues that small children acquire knowledge within a system, a system she characterizes as an "event structure." In her opinion, the acquisition of knowledge within an event structure system and the child's recognition of these event structures are necessary for children in order to acquire categories and language (Nelson, 1995, p. 232).

Nelson's theory describes young children's concept formation as a process of acquiring knowledge through the child's action and interaction in specific types of situations (Nelson, 1974). Such a situation is exemplified by how a 12-month-old child develops the concept of "ball" (Nelson, 1977a, p. 215). There are three main phases depicted in this process. In the first phase, the child forms a representation of the situation (an event representation – a script⁸) from his or her experience of the situation. This "event representation" encompasses all aspects of a concrete situation. In the first phase, objects in the situation are not necessarily experienced as having permanence but are recognized through the situational relationships that are established through the child's actions. In the next phase, the child begins to recognize the relationships among the objects, simply because certain objects vary while others remain constant. Then, gradually, an identity is established for the objects focused on. In the third phase, new members of the concept can be identified because the prominent and invariant traits can be identified as attributes by themselves.

In the example of the mother and child's interaction with a ball, the ball becomes the center of the child's interaction, where the following actions in the script are abstracted: mother throws; baby catches, rolls, bounces; playroom. The specific actions and relationships are altered depending on the context of the interaction, the only constant object in the series of situations with the ball rolling is the ball itself, but the ball does not exist outside these relationships in the first phase. Therefore, in order to create the idea of "ballness" instead of "ball" as many different objects in different relationships, the child must synthesize over time the various relationships into which the ball enters. This functional

⁸ Event representation and scripts can be seen as two substages within the first stage (Nelson, 1996, p. 16).

synthesis is the core of the concept. When a functional synthesis of a series of situations concerning a given object occurs, other objects may obtain a status within the same functional synthesis (e.g., ball number two). The third phase concerns the child's ability to recognize an object outside of its context. Nelson's point is that, in order to do this, the child must employ identifiable information. The child then analyzes the entire object into relevant attributes. This process begins as soon as the functional core is created.

Nelson's contribution in relation to Vygotsky's work is her empirical and theoretical demonstration that small children's concepts must be seen within a system of knowledge characterized as event structures. The importance of language is central in Nelson's theory to explain how the child goes from event representation to categorical systems. Nelson (1995, p. 232) notes that categories (defined as recognizing similarities among members) can be demonstrated in acting, but the abstract relation of asymmetrical inclusion (e.g., a table is a piece of furniture) can only be realized in a symbolic system such as natural language, and the child is not able to use language at this level until he or she is about 7 years old.⁹ This distinction is similar to Vygotsky's distinction between pre-concepts and concepts, and Nelson also refers to Vygotsky's point that even though the adult and the preschool child use the same word, the underlying structure and understanding is different for each. Although Nelson criticizes Vygotsky's conception of everyday concept formation in preschool age as taking place outside a system, she recognizes one of Vygotsky's main points:

Although Vygotsky's discussion conveys the impression that it is only scientific concepts that represent the "cultural", whereas spontaneous concepts are products of the individual unfettered by cultural knowledge, this impression is misleading. The child's initial conceptual knowledge system derives from experience in culturally arranged activities and scenes; thus there is no sudden discontinuity in human development from the natural to the sociocultural. Rather there are a series of accommodations of the individual's organization of experientially derived knowledge to conventional knowledge systems as learning in and through language progresses. (Nelson, 1995, p. 240)

⁹ This connection between the two theories' depiction of the age period for establishing "true" concepts demonstrates rather that school traditions are alike in the industrialized societies, as Scribner and Cole's (1981) research in Liberia showed, and that concept formation is a "natural" developmental process that is realized when the child is around 7 years old. See also Luria's research (1976) of how school traditions influence a person's use of general categories.

Nelson regards the child's experiential meeting with the world as central rather than the educational and cultural tradition of the caregiver. So even though she recognizes that social interaction and culture contribute to children's development of concepts, her theory does not solve the problem of the child's first encounter with the world as primarily a "natural" perceptual process because, in her theory, she does not recognize objects as social constructs. Nelson's theory of concept acquisition considers empirical knowledge forms to be the ideal forms (Nelson, 1995, figure 10.1, p. 238).

Forms of knowledge and social practice need a more central place in a theory of children's concept development than Nelson's theory gives room for. Turning to Wartofsky's theory of artifacts as a mediating link between the child and the world makes it possible to integrate social practice with various kinds of artifacts more central to an understanding of the conceptual development of children.

WARTOFSKY'S CONCEPTION OF ARTIFACT AS MEDIATING BETWEEN THE PERSON AND THE WORLD

Wartofsky argues that all human functions are related to the historical changes in the form and modes of human practice. Perception is the human function that he uses to demonstrate this view, and he argues for:

an explicit realist view of perception in two senses: *first*, that the 'objects of perception' are taken to be independent of perception, though they are mediated by the activity of perception, in that they are perceived by *means of our representation of them*. – The meditative entities, – I take to be representations – i.e. perceptual artefacts which we *do not perceive*, but *by means of which* we perceive real objects (or processes). Second: by virtue of this, perception is not simply an inward activity, directed upon some 'mental' or 'perceptual' entities 'in the mind' or 'in the brain'; but is itself a (mediated) form of outward activity, which is continuous with other forms of outward human actions in the world. Therefore, in its very genesis, perception is directly linked to that practical interaction with an external world whose qualities and structures are transformed by human action, and thus, by perception as well; but which transformations are nevertheless transformation *of* an objective and independently existing environment. (Wartofsky, 1973, pp. 193–194)

In Wartofsky's theory, perception is a relation between the person and the world, mediated by culturally produced artifacts that are created historically through human practice. This description of practice is the

same one finds within the cultural–historical traditions for activity (Leontiev, 1978). Wartofsky defines practice in the following way:

What is this “historical human praxis” which is proposed here as the genesis of human perception? It is, in the first place, the fundamental activity of producing and reproducing the conditions of species existence, or survival. What is distinctly *human* about this activity (since *all* species fall under this injunction of reproducing the species life) is that human beings do this by means of the creation of artefacts. – In more generic terms, the ‘tool’ may be *any* artefact created for the purpose of successful production and reproduction of the means of existence. – The crucial character of the human artefact is that its production, its use, and the attainment of skill in these, can be transmitted, and thus preserved within a social group, and through time, from one generation to the next. The symbolic communication of such skills in the production, reproduction and use of artefacts – i.e. the teaching or transmission of such skills is the context in which *mimicry or the imitation of an action becomes a characteristic human mode of activity.* (Wartofsky, 1973, pp. 200–201)

What is very important in this connection is Wartofsky's characterization of the artifacts (tool and language) as the objectification of human needs and intentions.¹⁰ He stresses that the cognitive and affective content are interwoven. The “objects” are what motivates the activity, a point that is important to stress because the intentional aspect has been neglected or directly denied in research about concept formation (see (Stenild, 1978).¹¹

Wartofsky distinguishes between primary, secondary, and tertiary artifacts:

Primary artefacts are those that are used in the direct production; *secondary* artefacts are those used in the preservation and transmission of the acquired skills or modes of action or praxis by which the production is carried out. Secondary artefacts are therefore *representations* of such modes of actions, and in this sense are *mimetic*, not simply of the *objects* of an environment – but of these objects as they are acted upon, or the mode of operation or action involving such objects.

(Wartofsky, 1973, p. 202)

In this sense, mastering secondary artifacts can be understood as symbolic conceptual competence within institutional practice traditions. The *tertiary* form of artifacts is abstracted from their direct

¹⁰ A point that is very close to Leontiev's characterization of activity as motivated by its objects (1978).

¹¹ Within the cognitive tradition, Pintrich and his colleagues (1993) distinction between warm and cold cognition is a first attempt to relate emotion/motive with cognition.

representational function, and Wartofsky suggests that artifacts “constitute a domain in which there is a free construction in the imagination of rules and operations different from those adopted for ordinary, this worldly praxis.” Wartofsky goes on to say that imagination is a derivative of “embodied representations or better embodies alternative canons of representation: embodied *in* actual artefacts, which express or picture this alternative mode. Once the visual picture can be ‘lived in’, perceptually, it can also come to colour and change our perception of the ‘actual’ world, as envisioning possibilities in it not presently recognized” (Wartofsky, p. 209).

Tertiary concepts can be seen as a mastery of theoretical–dialectical knowledge that provides a possibility for formulation of core models and exploration through experimentation with these models in concrete situations.

Wartofsky gives us a clear idea about human psychic functions as developed through participation in human practice with artifacts. One could also get the impression that primary, secondary, and tertiary artifacts can only be encountered in a developmental sequence, where competence with primary artifacts is the foundation for the child’s appropriation of secondary artifacts, and so forth. However, to understand Wartofsky’s theory, it is important to remember that primary, secondary, and tertiary artifacts exist as collective artifacts and my hypothesis is that, dependent on the practice it participates in, the child may become acquainted with all three types of artifacts early on and that, in line with Vygotsky’s idea of the interconnectedness of everyday and scientific concepts, competence with these three types of artifacts is interwoven. Therefore, a child’s competence with secondary and tertiary artifacts can enrich his or her competence with primary artifacts. Play is one way that this can happen as I will try to argue from the perspective of Vygotsky’s theory of play.

PLAY AS EXPERIMENTATION WITH RULES AND MODELS

Vygotsky points out that the features of human perception of real objects are not only colors and shapes, but also meaning. He expresses this in a ratio where the object is the numerator and the meaning is the denominator (object/meaning). This ratio symbolizes the idea that all human perception is made up of generalized rather than isolated instances of perception. The object dominates the meaning, but what Vygotsky points out is that in a child’s play *this ratio can be inverted* and the meaning can dominate the object, for example, when a stick can be a horse or a gun. In play, the child can operate with meanings detached from their usual objects and actions. For the small child, there is some constraint on

what can function as the meaning of an object. Vygotsky characterizes this reversal of the ratio between object and meaning as an intermediate stage between early childhood and the adult's competence with meaning. For the adult, meaning can come to dominate thoughts totally free of real situations. Vygotsky says that:

A divergence between the field of meaning and vision first occurs at preschool age. In play thought is separated from objects, and action arises from the ideas rather than from things: a piece of wood begins to be a doll and a stick becomes a horse. Action according to rules begins to be determined by ideas and not by objects themselves. This is such a reversal of the child's relation to the real immediate, concrete situation that it is hard to underestimate its full significance. (Vygotsky, 1978, p. 97)

In the same way as the object-meaning ratio, Vygotsky notes that the action-meaning ratio can be reversed in play. Vygotsky points out that, when action becomes separated from meaning in play, the rules become very explicit in play. "Thus the essential attribute of play is a rule that has become a desire. Spinoza's notion of 'an idea which has become a desire, a concept which has turned into a passion' finds its prototype in play, which is the realm of spontaneity and freedom" (Vygotsky, 1978, p. 99). The children can play the persons that do activities that they want to do or change, for example, bus driver or doctor. In addition, play enriches the child's everyday activity through developing the child's concepts and motives.

Combining Wartofsky's ideas of tertiary artifacts with Vygotsky's theory play can be seen as a step toward mastering tertiary artifacts, that is, where children can experiment with the meaning in an imagined world such as role-play. For preschool children, experimentation with objects and rules that attain "new meanings," can become aspects of play within an imagined world. This can be found when children develop the same game over time and extend and change the rules of the game. Today, this can also be found in commercial games, such as *Dungeons and Dragons* and in computer games. So the three forms of representation (primary, secondary, and tertiary) find their first form in children's play activity.

APPROPRIATION OF CONCEPTS AS CONCEPTUAL COMPETENCE THROUGH VARIOUS TYPES OF SOCIAL PRACTICE — A DEVELOPMENTAL PERSPECTIVE

Human practice is the key to understanding how societal collective knowledge is acquired as personal concepts. Furthermore, it is important to be aware that there is a range of institutions in society with different traditions for artifacts and practice. In Figure 10.1, I have distinguished

between three institutions, namely, home, school, and work, but one could easily mention several others that influence childhood: day care, afterschool, commercial institutions, health systems, church, and several other more-specific institutions. In Western society, the central institutions for small children, preschool children, and schoolchildren are home, day care, and school.¹² A child's psychic functions are culturally created from the very first moments that he or she participates in these collective institutions. Wartofsky argues that a child's needs from the first satisfaction become cultural through the objects that satisfy them. Objects, procedures, and meanings are produced in cultural institutions. From a child's first encounter with the world, his or her biological needs are transformed into cultural needs. Therefore, the development of the child's perception and intention becomes attached to or anchored in the artifacts and knowledge systems and forms that exist and dominate in the institutions that the child becomes part of (at birth this is usually the maternity ward and the home).

A child's interaction with others is dependent on the types of artifacts (including knowledge forms) that dominate the practice of the institutions where the child lives his or her everyday life. Concepts can be viewed as action capacities with artifacts in these practice situations. Content and capacity with everyday concepts are closely interwoven in the conceptual competence of a child. The capacity aspect of a child's everyday concepts is shown in the child's readiness to use his conceptual competence in relevant settings. The content aspect is the meaning of situations and objects that a child can act on. Concepts regarded as competences to act in different situations can never be regarded as static, for each time they are used they are extended because social situations are never quite the same. Concepts must be understood in this functional connection. Therefore, the aspect of intention is of crucial importance. It is through the intentional participation in activities where communication and action are tightly interwoven that conceptual competences are acquired and manifested.

A child's relation to the world changes through developmental periods when he or she meets new artifacts and appropriates new competences and he or she thereby gets new possibilities of relating differently to the world.

Both Vygotsky (1998b) and Elkonin (1999) describe six stages in children's development. Elkonin specifies how these stages are related to

¹² In other types of society, work is as dominant as school for some children at 7 or 8 years old, or school is not included among the institutional practice because children function as cheap labor, and there is no time for school (see Hundeide, 2005), or that children can be valued contributors in home activities (Rogoff, 2003).

different societal practice and interconnected into developmental-age periods reflecting the dominating practice in Western industrialized society. In Elkonin's model there are three periods, each characterized by two stages. In each new developmental period, first the child's orientation, motive, and intentions develop, then the competence develops. When the child goes from one period to the next, the change takes place first through crises in the child's emotional relationship to the world by the child developing a new orientation to the world and to new motives. The educational practice that supports the child's building an orientation toward new aspects of the world and new motives is as important as the promotion of the child's appropriation of competence. One cannot be realized without the other. In Figure 10.2, I have summarized this relationship by using the two perspectives of Figure 10.1 (societal and personal) to combine Vygotsky's and Elkonin's theory of developmental stages with Davydov's theory of knowledge forms and Wartofsky's representational theory. In the diagram, I also include Bruner's (Bruner et al., 1966) distinction between enactive, iconic, and symbolic forms of representations. In Bruner's theory, the child's first competencies are connected to his or her manual and perceptual activities, which form the basis of enactive and iconic representation. Bruner argues that these forms of representation are the foundation for but are also changed by the child's development of symbolic representation when he or she enters school. This characteristic of the development of representation fits in with Vygotsky's (1978) writings about the change from perceptual orientation to imagination and, later, the child's ability to act on a symbolic level.

In the following section, I will discuss how educational "tools" can influence preschool children's appropriation of conceptual competence and motives in an educational setting. For most preschool children in Denmark and other Western countries, the educational setting is home and kindergarten. The instruction in these settings is usually adapted to how the everyday activities are structured to allow for a child's need for food, rest, and play activities. What the child learns in these everyday practices depends on the objects (artifacts) that the adults make available. Through objects and activities caregivers initiate a child's appropriation of knowledge.

In connection with Figure 10.1, I have postulated that there is not a one-to-one relation between knowledge form and institutional practice. Therefore, the question in the last part of this article is, Can everyday settings in which preschool children take part contain several forms of knowledge, and can theoretical knowledge in the form of experimentation within an imagined world be part of the everyday practices in which preschool children take part?

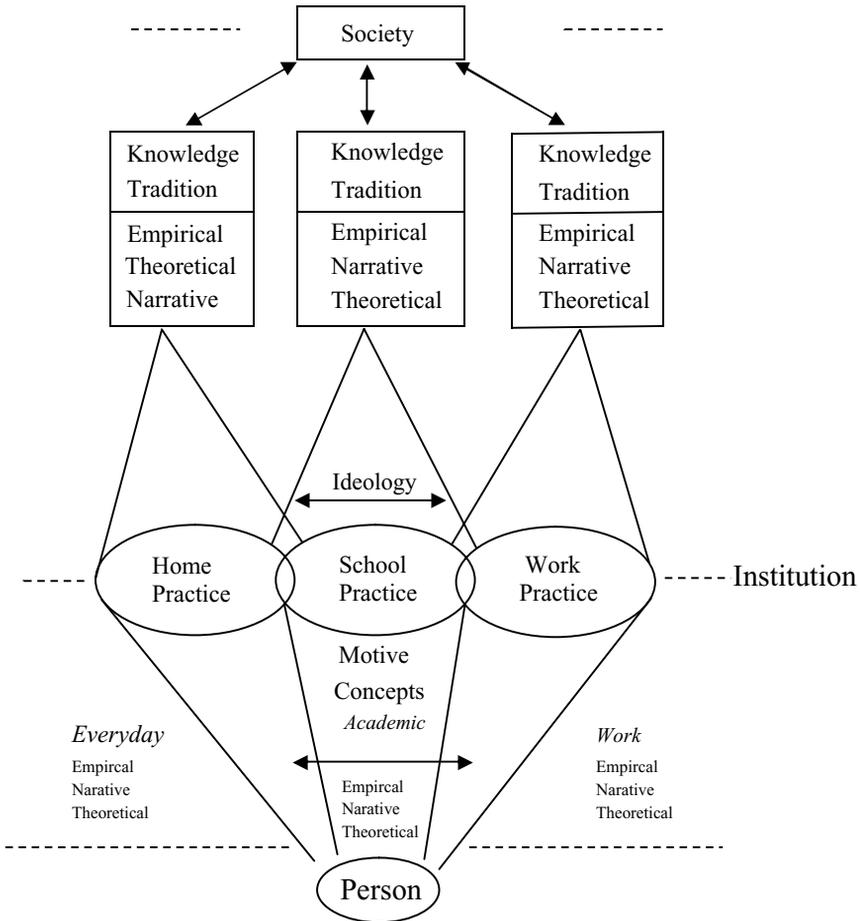


FIGURE 10.2. The model of how societal knowledge and personal concepts are created through a person's activity in institutional practice.

INSTRUCTIONAL PLAY MATERIAL
FOR PRESCHOOL CHILDREN

Preschool children appropriate competence by participating in shared activities with various cultural artifacts that the adults bring into the social situation.¹³ In educational situations adults create situations in which children learn to use these artifacts. By mediating their

¹³ In their play, children also create artifacts that they bring into the social situation and share with each other. That mainly happens independently of adults (Corsaro, 1997), but in this chapter, this does not influence the argument I am building up.

interaction with small children with cultural artifacts and by giving the child objects, adults demonstrate for children that these objects should be attended to.

In most educational material for preschool children, a child is required to participate by manual acting. When playing with puzzles, self-controlling materials, and group games the children are asked to participate by acting manually with symbolic representations, but at the same time, they also get tasks that require their reflection before acting. An important aspect of these materials is that the tasks that they set require the child's actions to be based on his or her reflection, either through visual exploration or through communication.

In the following, I will draw on my own project of studying preschool children's concept formation through play with pedagogical play material that aims at promoting children's concept learning (Hedegaard, 1984).¹⁴ I will focus on games produced for preschool children and present three types of material that illustrate the form of concepts that are promoted by these materials.

THE PLAY GROUP PROJECT

The aim of this project was to study how educational play material with symbolic content and traditions influenced preschool children's social interaction and their appropriation of conceptual competences. In addition, the aim was to find out what kind of negative consequences some types of material could have for both children's social interaction and the type of conceptual competence children appropriated. The play group was created as an institution at the Department of Psychology at Aarhus University with children ranging from 3 to 5 years in age. The group met for three hours each week with ten to twelve children participating. This institution existed for three years with the participation over the years of twenty-four children. All children participated for at least six months, most of them for two years, and some for all three years (they were taken out when they started in first grade in school). Thirteen students participated in the project, each time with two or three present in a session together with a kindergarten teacher (she was the same throughout the whole period) and the researcher. The sequence of the activities was as follows: the children arrived and were given time to find play things and

¹⁴ The usefulness of this project to argue about preschool children's encounter with knowledge systems in play material and games is not affected by the twenty years that have passed, because the principle(s) in the games can still be evaluated, and, furthermore, if one looks at play material today, many of the same types with the same content are present in kindergarten.

contact the other children and student helpers. After twenty minutes, the kindergarten teacher called everybody to sit at a big table to talk about a specific topic while she illustrated the topic with different objects for another twenty minutes. This topic was most often connected to the research activity that would follow. Then the children again had time to play with each other and with the playthings that were in the playroom,¹⁵ while the researcher and students put out the games that they would use later. Many times some of the children came to see what was prepared and wanted to play immediately. The play with games was arranged in groups; one group was the research group (here the participant observer was placed). We took care to equalize the children's participation in the research group over time. After the games, it was snack time. After snack time the children could draw or play or the whole group went outside to play. At the end of each session, the kindergarten teacher assembled all children and read a storybook until the last parent had arrived to take his or her child home.

The educational play material was collected by contacting about fifty Danish firms producing play material for kindergartens, getting free samples, or buying material, which resulted in a representative sample aimed at Danish kindergartens of about 100 educational materials. The types of material that were examined were puzzles, games such as domino and picture lotto with conceptual content, self-controlling concept material, books with concept formation tasks for preschool children, language training materials, and materials for training children's logical reasoning.¹⁶

The research method can be described as experimentation with play material and making protocols through participant observation, where two researchers always worked together; the one playing with the children, the other observing. One hundred to 120 protocols were collected, the exact number depending on whether nonstructured role-play observations were included or only observations of play with educational materials, for example, games and books.

The protocols were analyzed in relation to (1) the content of the material, the competence the children demonstrated, and problems they had in the play/game activities; and (2) the children's intentions and social interaction. From this, we drew conclusions about the children's concept learning.

In the following, I have chosen two individual games and two group games: a puzzle, a picture-matching material, and two different kinds of

¹⁵ This room was a permanent institution with tables, chairs, decoration, and play material for preschool children.

¹⁶ None of these materials implied the child's ability to read.

lotto picture. Even though the puzzle and the picture-matching material can be seen as material for a single child, in the playgroup, we encouraged children to participate and help each other with these games.

The difference between the two lotto picture games presented demonstrates the diversity in a fairly popular game with regard to knowledge type and content as well as how differently the material contributed to the children's involvement and competence.

Content and Possibilities for Development of Competence

Many different themes can be presented in the picture of a puzzle; they can vary from fairy tales and figures from comic strips to realistic drawings or photos or geometric figures. The conceptual competence a child can acquire depends both of the content and how the puzzle is cut in relation to the thematic content. A cutting that underlines meaning and objects as wholes can direct the child toward analyzing the relation between the parts and the whole and offers the possibility for a conversation between an adult and the child about how the pieces are related.

Observation extracted from a puzzle game

Puzzle: A green grocery with cuttings that make the object the pieces

Participants: Søren: 3.9 year, Adult (A)

Søren takes out the pieces, one at a time.

Then A starts the game by asking: What is this?

Søren looks at the piece A is holding in her hand, but does not answer.

A: Do you think you can find where it belongs?

Søren: "Yes!" He smiles and starts to place the pieces

A: What is it you have put on the board?

Søren: Beers.

A points to another piece: What is this?

Søren: Bananas.

A: Do you eat bananas at home?

Søren: Yes me, my dad, and Kalle (his brother)

Søren finds another piece and A asks what it is.

Søren: Husband and wife.

A: What are they doing?

Søren: They have a basket to pick cherries in.

A remarks about a piece with a pair of scales: "I do not think you ever have seen such a thing, this is a pair of scales."

Søren: I have seen one where we buy beers and bananas.

This puzzle offers the possibility to talk about the things in a grocery store. In general, Søren does not talk very much because he is shy, but he seems interested in solving the puzzle and talking with the adult about the objects and his experience from a grocery. This type of puzzle gives him the possibility to develop narrative forms of concepts with activities and objects in a grocery store.

The content in *picture-matching material* depends on establishing a correct relation between ranges of objects. This material can be found in books or in games with boards and cards. These kinds of materials are relevant for recognizing numbers and letters and quantity matching. But when the matching material aims at a part–whole or cause–effect relation, and there is not a general theme that connects the various tasks, the child’s activity has to build on his or her knowledge of these relations, and the material rarely contributes very much to extend this knowledge. With several of these materials, the children had problems because they did not know the relations beforehand, so that connections were found by trial and error without the child’s understanding of the relation, as in the following example.

Observation extracted from a self-controlling matching material: matching parts with objects

Participants: Jens 4.10, Adult

Jens takes the picture of the bishop and places it on the bishop’s hat

Adult: What is that? (Point to the bishop’s hat)

Jens: A kind of iron (seems unsure)

Adult: No, I think it is a hat. Did you only guess?

Jens does not answer but takes another picture and says: This is a paint brush

Adult: I think it is the tail of a donkey

By matching and sorting materials, the children can orient themselves toward looking for differences or likenesses or part–whole relations, but they do not get much new knowledge about the world because the knowledge is split up, atomized, and often spread in as many parts as there are tasks in each game or book. With the best tasks, a general principle guided the child’s activity, that is, to sort different objects into two categories, for example, hard and soft objects, dead and living objects, objects from a bakery or a butcher, whereby the children could become acquainted with categories. Unfortunately, in most cases, the objects were drawn only in outline in order to favor the abstract variation within a category at the expense of concrete and realistic pictures of the objects. These abstractions created problems because, when the children found it

difficult to see what the drawings were about, they also found it difficult to relate a category to the relevant objects.

The matching and sorting material (books, self-controlling materials), as well as several of the group games, were based on the empirical form of knowledge. These materials and the connected tasks gave associations to tasks in intelligence tests, where the material is made general and culture-independent. In the intelligence tests, it is also the general simplified drawings of objects, people, and events that dominate.

In the *group game lotto picture*, we found one case of a lotto game where the board had a general theme that could guide the children's placement of the cards and where the task could enable children to acquire narrative and theoretical concepts. In this game, the pieces with pictures of objects were to be placed on a board that depicted a general concept, so that the pieces could be seen as depicting aspects of the concept without a one to one relation (see Figure 10.3). One showed various professional activities (firemen, fisherman, dentist, farmer, doctor etc. – ten boards in total). The children who participated in this game were able to understand the general theme and could talk about the relations so that real communication took place between the participants.

The relationship between part and whole in this lotto was very meaningful for the children, and they could relate the specific aspects on the cards of this job activity to the board, and, at the same time, they liked to talk about what they saw.

The knowledge depicted in the lotto-picture game with work situations gave the children the possibility to encounter both narrative and theoretical knowledge, depending on how the material was introduced to the children. In this specific case, it was primarily the narrative knowledge form that came into the foreground. If the children had been expected to play and experiment with the relationships between the conceptual aspects, they would have been given other instructions for play and other conditions than a single play setting allows.

Social Interaction and Involvement

It is easy to see that the involvement varies with the materials used. When doing *puzzles* and solving tasks in *books*, training conceptual competence with an adult by their side, the children do not express wishes to leave the situation. The children enjoyed being together with an adult doing these activities.

They also want to play *domino and lotto games*, especially when an adult participates. The most popular games are the ones they know well. However, in several of the new educational games, they express

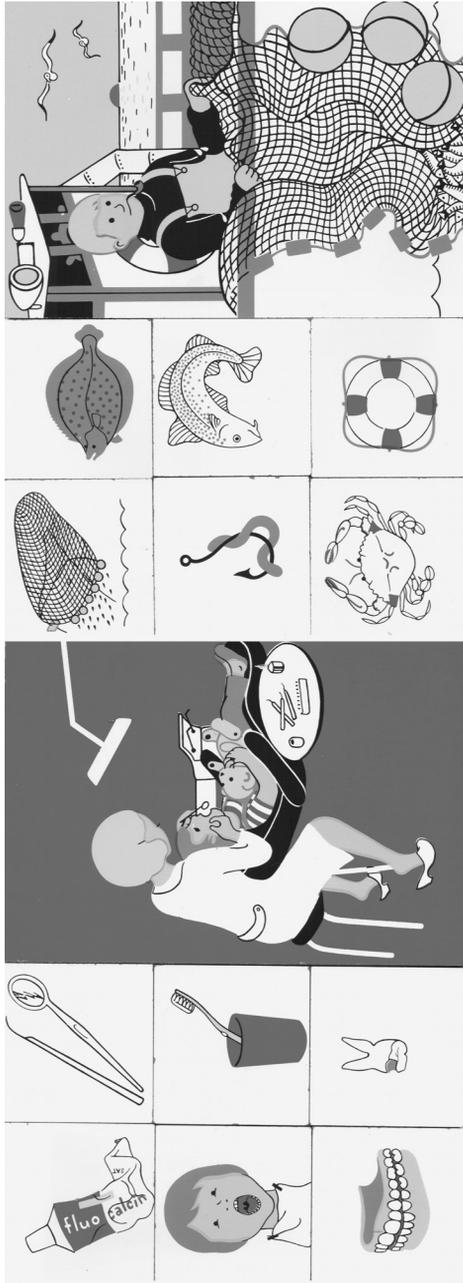


FIGURE 10.3. Lotto picture game with work situations.

their wish to leave the game if the task seems meaningless to them, for example, if they cannot see what the picture depicts or understand the relation that they are supposed to find. This is the case with *quantity-dominos* and *perspective-dominos*. Also, when the children can see that they are not winning in these educational games, they express a wish to leave the game.

Perspective Domino:

Participants: Svend 5.1, Jens: 5.3, Barbara: 5.0, Robert: 5.1, Sofie, 5.5, Adult

In this game the same object is depicted from different angles, and the children have to place their cards so the same objects touch each other.

Svend stands up when each player has one brick left and says: I know I am not going to win, and leaves

[Competition dominates over the coziness of being together and the interest in the activity. The competition can also take the form of an argument between the children as seen in the same game immediately after Svend has left]

Adult: So here is a new object (a TV from the side)

Robert: A record-player

Barbara: A television

Robert: A record-player

Barbara: A television

Robert: No, a record-player

Barbara: No, a television

This exchange between the two proceeds more and more intensely. None of the other children or the adult interrupts, and at last Roberts says in a rather calm and self-assured manner: This is a record-player.

Robert has finished his cards, and without saying anything he lets himself slide down from the chair to the floor, where he tumbles around with another chair.

Sofie is now eager to finish. She is turning on the chair and says "I will be happy when we are finished."

Barbara repeats what Sofie has just said.

Sofie puts down her last card. Stands up demonstratively and says "Now I do not care to participate any more."

In this game, the children have been very competitive though the adult has tried to keep this aspect down and the focus on the content.

What we found in general by analyzing the observation of group-play is that the activity with this type of educational material occurs on the adult's conditions. This does not mean that the children are not interested in participating or that they do not choose to play with them spontaneously, but they always invite adults to participate. In these games, the adult and the children can participate together on an equal footing if the adult takes the game seriously. However, if the adult cheats to make it easier for the child, and the child finds out, he or she will be disappointed.

As pedagogues and researchers, we had hoped to find (1) that adults and children would find solutions together, (2) that the children would help each other, and (3) that the children were interested in the content. But often what we found was (A) that the adults decide what to do and (B) that the oldest children win the games. In order to support points (1) to (3), the tasks connected to the material must be more than mere matching and sorting, and they must challenge the children in a meaningful way so that they can inspire them to experiment with the material.

In general, we found that one cannot use culturally established games to teach children something that is hidden within the game. Instead, adults should play games with the purpose of being together with children on equal terms and teach them content more directly in other situations because the children have no trouble being interested in the content when presented as tasks in books.

DISCUSSION OF THE KNOWLEDGE PUT INTO EDUCATIONAL MATERIAL AND CHILDREN'S ACTIVITIES WITH SUCH MATERIAL

In the 1980s, as a result of the cognitive traditions in psychology and education, the importance of stimulating and challenging small children's and preschool children's cognitive development led to the production of educational material, which was aimed at giving children concepts that were relevant for their development. Many of the materials were inspired by the tasks in intelligence tests or oriented toward preparing children for school. Today, many of these materials are transformed into computer material, but they are still based on the same principles as the hard cover items. This is demonstrated, for example, by the research connected to the project "5th dimension" (Cole, 1996), but this research also demonstrates how it is possible to transcend these commercial materials with task cards and communication tasks with a "wizard." It is important to transcend the training aspects inherent in several of these items by constructing materials and tasks that offer children the possibility for

orientation toward play and experimentation. In this manner, it may be possible to transcend the traditions in education of presenting children with educational material that primarily leads to their appropriation of empirical concepts.

THE IMPORTANCE OF PLAY FOR THE PRESCHOOL CHILD'S DEVELOPMENT AND CONCEPT FORMATION

The social situation in which a child's play takes place is created by the child, by the other participants, and with the artifacts in the situation. The pedagogue can use play to promote children's conceptual competence. She can invite the child to play with her and with certain materials and through this participation introduce new knowledge to the child both in form and content.

Shared participation in play is a way to do this in relation to preschool children. At the same time this is a desirable activity that has social, intellectual, and emotional importance for the child's development. In play, the child both learns from other children and tries out his or her newly acquired competencies. Through play, the adult can also contact and support the preschool child in his or her appropriation of conceptual competencies because play can be the leading activity for preschool children, and, therefore, it can contribute to children's development of imaginary/symbolic relations to the world. In principle, educational materials can support the child's development of competencies with all three forms of concept: the empirical, the narrative, and the theoretical, but in practice, in the playgroup project it was unfortunately the empirical – and at best the narrative – form of knowledge that the children became oriented toward.

If pedagogues and parents do not pay attention to playthings and educational play material, but rather let commercial interest determine the choice, the child may appropriate skills and competencies that are inappropriate in relation to the child's everyday life, and this can be detrimental to the child's development of a theoretical orientation to his or her surroundings. Many educational play materials (and actually most of those in the research project described here) are constructed to train the child's functions such as discrimination and categorization of objects and not to promote a theoretical orientation to the world. Theoretical concept material can orient the child toward the relation between aspects of the world and relate this to a whole in a way that encourages the child to play and experiment with conceptual relations. Instead, though, most of the materials we analyzed trained the children to pass intelligence tests but did not allow much creative experimentation or

symbolic play activity. Play materials ought not to be formalized function training materials where visual discrimination, remembering, and manipulations that dominate without a content or task that is meaningful for the child. Rather, educational material ought to be a help for children to explore and get competencies in relation to what happens in various social situations in their everyday life, and educational material should motivate them to enter new social situations and give them conceptual tools to explore these.

CONCLUSION

In the first part of this chapter, a distinction between societal knowledge and personal concepts was introduced. Societal knowledge, I argued, must be understood in relation to how it has developed through various forms of practice as both thematic and structural forms of knowledge. The thematic aspect, I argued, is connected to the objective of practice in institutions; the structural aspect is related to methodological considerations within various research traditions. Three forms of knowledge – the empirical, the narrative, and the theoretical–dialectical – were described. The empirical knowledge form dominates in school, but narrative and theoretical knowledge is also found within school education. The questions then were, Can preschool children encounter theoretical knowledge in their everyday activities? Can preschool children appropriate theoretical knowledge so that their everyday concepts may reflect the methodological aspects of this form of knowledge?

Based on a research project with educational play material for preschool children, I have argued that preschool children can encounter theoretical concepts. But most of the materials analyzed in this project did not offer these possibilities, and the few that did so, I am sorry to say, did not encourage the children to experiment as in play, so the theoretical–dialectical concepts were not promoted by this activity. However, I would still argue that an educational approach can support children's appropriation of theoretical concepts that are relevant to the child's ability to make conceptual experiments as in preschool children's role-play. Children's concepts about various forms of jobs or the seasons of the year, as well as their conceptual competence within family practice, often take the form of conceptual competences with theoretical concepts where each part is dependent on the other parts.

My theoretical arguments have opposed the idea that children's development should be regarded as a natural sequence where their appropriation of empirical concepts should be seen as a prerequisite for their appropriation of narrative and theoretical concepts. Rather, I would argue that

it is the knowledge systems that dominate the practice children participate in at different ages. If we want to give children conceptual competence that is more oriented toward theoretical knowledge, we must make this part of their everyday practice. So parents and educators should change the practice traditions that the children participate in to change the conceptual competences the child will acquire. Play, as the key activity for preschool children, offers the possibility for such a development where the motivational aspect is also involved. Games can be of value if the content gives the child a theoretical orientation and possibility for experimentation and if the preschool children feel that they can participate in the games with adults on equal terms.