DEAFNESS AND INTERSUBJECTIVITY :

AN OBSERVATIONAL STUDY OF THE CONSTRUCTION OF INTERSUBJECTIVITY IN A TEST-SITUATION

**Anita van Loon**

# Contents

# Introduction

The present paper is deliberately divided into two parts, comprising seven chapters. Part I deals with the theoretical foundation on which part II is based.

In part I, a description is given of past and current theories on cognitive development.
In chapter 1, the theories of Piaget and Vygotsky will be described. Both theories are characterised by a more or less individualistic view of cognitive development. These theories are described not so much to adopt their responses, which are likely to be contingent to their cultural historical context, but in order to learn from them how to raise questions and open ways for further research. Gradually, these past theories of psychological development of the individual have led to a recognition of the social in studies of development. The focus has shift to the role of social interaction in cognitive development (Perret-Clermont, 1980). The current emphasis within this paradigm is on the manner in which young children actively construct their own competencies in interacting and coping with the social environment.
In chapter 2, this so-called socio-psychological paradigm is discussed.

Part II of this paper, starting with chapter 4 is concerned with a research on deaf children which is carried out within the socio-psychological framework of cognitive development. This research, conducted in 1993, was centred on the analyses of socio-cognitive interactions between deaf children in a spatial perspective-taking task. On this research, I have carried out secondary analyses. These secondary analyses are described in chapter 5, discussed in chapter 6 and concluded in chapter 7. The aim of these analyses is to reveal the communication and cognitive processes through which a shared understanding of the task is negotiated.

The notion of intersubjectivity is a central aspect of these secondary analyses. Intersubjectivity can be described as an interactive process by means of which "two individuals are able to agree on the definition of a given task and are aware that they do so" (Rommetveit, 1985; Wertsch, 1984). Applying the concept of intersubjectivity to the study of deaf children and their capacities sheds a different light upon the current "state of the art". Because traditionally, child psychologists have often considered that if a subject does not understand the other's discourse, it is because he is incompetent in the sense that he lacks the prerequisite operative structures. However, in viewing the social context, in which cognitive development takes place, not only as the surrounding context, but also as an integral part of this development, I hypothesise that it is not so much the acquisition of cognitions which is problematic for deaf children, as it is to participate in these social interactions which are considered to regulate this acquisition.

Within this contemporary view of cognition, the child's deficient performance is explained in a different way. Interaction between the adult and the child might be failing because they don't have the same frame of reference, they commit to different experiences, the meaning of the situation is different for them or they are not involved in it for the same reasons. In other words: it is the establishment of an intersubjectivity which is hampered
It is for this reason that deaf children's (cognitive) competencies are worthy of a re-evaluation.

I propose that the concept of intersubjectivity can contribute to a reinterpretation of certain obtained negative testresults of deaf children. In the past, these negative results of deaf children's capacities have brought about much harm to the way deaf children have been considered and treated. In this light, the main other aim of this paper is to show how perspectives on deaf children and their development have changed as a function of the paradigm shift from a focus on intellectual processes within the individual child towards an understanding of the interpersonal context of cognitive growth. This is done in chapter 3.

By taking into account the processes of the interaction in a test-situation and applying the concept of intersubjectivity, I hope that this eventually will lead to more reliable test-results of the capacities of deaf children.

# Part I:      Theoretical Foundation

*"Science, since people must do it, is a socially embedded activity.... Much of its change through time does not record a closer approach to absolute truth, but the alteration of cultural contexts that influence it so strongly".*

Stepen Jay Gould, *The Mismeasure of Man*

# Chapter 1. Traditional Views of Cognitive Development

In this chapter two theories concerning cognitive development that have been developed in the past will be described. There are two reasons for this:

- 🕭      The first reason is that this description will help to understand more fully the present research paradigm which will be described in chapter 2.
- 🕭      The second reason is that the authors of these theories have made main contributions for the development of psychology, child studies and education. They have influenced indirectly political and societal policies and stands concerning education and other institutions. In chapter 3, I will describe how  this has affected the population of deaf people.

The chapter will start with the Piagetian approach who's theory of intellectual development has set the stage for various subsequent theories of cognitive development. Next, the Vygotskian approach will be described. His developmental theory is widely accepted in the studies of cognitive development.

## 1.1. The Piagetian Approach

Many theories of cognitive development and socio-cognitive development (Perret-Clermont, 1980) have extended or built upon Piaget's theory of intellectual development. Central to Piaget's theory is the view of the individual child constructing, through interaction primarily with the physical environment, but also with peers, increasingly more powerful and general cognitive structures. The basic principles of Piaget's theory are outlined below after describing the cultural-historical roots in which his ideas developed.

### 1.1.1. The Socio-Cultural and Historical Context

Piaget was born in Neuchâtel, a small university town in Switzerland in 1896. He pertained to a political entity within a "confederation of minorities". The citizens of Neuchâtel did not feel the urgency to "civilise the world" through his culture - but rather through his religious ethic. When Neuchâtel would have been a Catholic region, it would have considered instruction as a commodity to be shared out by a central authority in order to insure the consistency of the social organisation. However, Neuchâtel was a Protestant region where the religious milieu underlined the dignified status of the individual (and not of the church), who was meant to communicate directly with God (Anne-Nelly Perret-Clermont, 1996a).

As a citizen of a nation of agricultors, watch-makers, mercenaries, merchants and bankers, the transactions Piaget was familiar with were often business transactions. His political, cultural, religious and familial background encouraged a critical distance from authority. In the ideological atmosphere in which he lived, authority was generally seen as something extraneous and repressive. Institutions had a long history of their negotiations of a space of autonomy in the face of foreign powers. Personal experience was seen as unique and personal, as a kind of incommunicable premises.  Piaget considered the development of personal thought as an essential and universal task. In his theory, however, he ignored the importance of concrete social and educational solidarities and of relational interdependencies which make psychological growth possible and offer an access to knowledge that is already prepared by the efforts of former generations. This led Piaget to undervalue the role of elders and of peers in his theory. Knowing this background, Piaget's theory can be better understood. The characteristics of his theory will be discussed in the next paragraphs.

## 1.1.2. Basic principles of Piaget's Theory

Piaget's theory of cognitive development (Piaget, 1952) is supposed to explain how the child adapts to and perceives events and objects in his or her environment. Piaget views the child as playing an active role in his construction of knowledge about the world. Piaget describes development as a process proceeding from an individual level to a social level. Children internalise their own operations on the world in a structured form, by experiencing desequilibrium and restructuring this. I will now describe how, according to Piaget, these processes lead to cognitive growth.

Piaget postulates that human beings inherit two basic tendencies. The first one is *organisation*. This is the inborn capacity to systematise and combine physical or psychological structures into coherent systems. (For example when an infant has learned to combine looking and grasping with the previous reflex of sucking organisation of cognitive structures into more complex systems has occurred). Organisation is thus the tendency to develop ever more comprehensive systems (higher-order structures). The second one is *adaptation*. This is the tendency to strive towards a state of balance or equilibrium. According to Piaget, experiences are transformed by psychological processes in such a way that the child can use them in dealing with new situations.. Adaptation is achieved through two interconnected or complementary processes: *assimilation* and *accommodation*. These two processes are utilised in *schemes* (organised patterns of behaviour or thought that children might formulate as they interact with their environment) and later in *mental* operations, such as imagination. Whenever a child encounters a new experience that cannot be easily fitted into an existing scheme, adaptation is necessary. A child may adapt either by interpreting the experience so that it does fit in an existing scheme (assimilation) or by changing an existing scheme to incorporate the experience (accommodation). Intellectual processes seek a balance through the process of *equilibration*. Children use self-regulation to bring coherence and stability to their conception of the world and to comprehend inconsistencies in experience.
Organisation, adaptation, assimilation, accommodation, and equilibration are the basic principles of Piaget's theory.

Other principles are based on differences between the thinking of younger and older children. These differences became apparent when Piaget interviewed children and asked them to explain the reasoning behind their answers. To develop an understanding of this, Piaget proposes that we have to look at the qualitative development of children's problemsolving abilities. The following is an example from one of Piaget's dialogues with a 7 years old child:

| Piaget: | Does the moon move or not? |
|---------|---------------------------|
| Child: | When we go, it goes. |
| Piaget: | What makes it move? |
| Child: | We do. |
| Piaget: | How? |
| Child: | When we walk. It goes by itself. (Piaget, 1929) |

Based on observations like this one, Piaget arrived at a description of a period during childhood which is characterised by *egocentrism*. In the example above, it is because the moon appears to move with the child, that he concludes that it really does so. This kind of thinking occurs because the child views the universe from his own point of view. He finds it hard to *decenter*, that is: to take the perspective of another person. The following dialogue with a 3-years old is another example of the difficulty a child can have in taking the perspective of another.

| Piaget: | Have you any brothers or sisters? |
| --- | --- |
| Little boy: | Yes, a brother. |
| Piaget: | What is his name? |
| Little boy: | Sammy. |
| Piaget: | Does Sammy have a brother? |
| Little boy: | No. |

The conclusion that young children find it difficult to take another person's point of view was illustrated in Piaget's famous 'three mountains experiment'. In this experiment, children were asked to say how a doll, placed in various positions, would view an array of three mountains from different perspectives. They were allowed to look at a set of drawings of the three mountains and to select the correct one from the doll's point of view. Young children selected pictures based on their perspective, not that of the doll.

Subsequently, with the growth of knowledge, the child makes a shift from his own egocentric position and learns to make a distinction between what he observes and what he knows. Three principles - decentration, operation and conservation - are proposed to explain the remarkable difference between the thinking of younger and older children. Therefore these principles are described below.

*Decentration* refers to the ability of a child to consider more than one characteristic of an object at the same time. Young children tend to have difficulties in concentrating on more than one characteristic of an object at the same time. This causes them to focus on their own point of view even when they are asked to imagine a different point of view.

The concept of *operation* explains the way conservation is mastered. Operation is viewed as an interiorised action which modifies the object of knowledge. The most distinctive aspect of an operation is *reversibility*. This is the awareness that conditions can be mentally reversed. Only an older child can imagine how conditions were, before they were altered. Young children have difficulties in imagining this.

*Conservation* refers to the idea that certain properties of objects (such as weight or mass) remain invariant despite changes in shape or appearance. One of Piaget's famous experiments concerns the conservation of liquid. A four-year old child and a seven-year old child are given a problem. Two containers, A and B, are of equal capacity but A is wide and B is narrow. Container A is filled to a certain height and the children are each asked separately to pour the same quantity of liquid into container B. Contrary to the older child, the four-year-old cannot grasp that the smaller diameter of B requires a higher level of liquid, which in fact is more complex. For the older child, it is clear that the liquid level in container B has to be higher. According to him, the answer of the younger child is incredibly stupid.



The response of the 4-year old    The response of the 7-year old
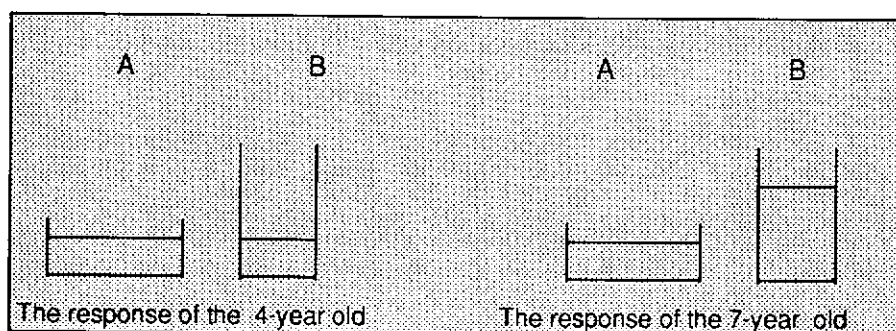
For Piaget, both responses are interesting. The younger child cannot see that A and B are not equal, since he is using a qualitatively different kind of reasoning. He does not yet have the mental operations that will enable him to understand conservation. The older child finds it difficult to understand why the younger child cannot see his mistake.

Summarising, cognitive development (as Piaget sees it) is based on alterations in intellectual structures. These result from the two "innate predispositions" organisation and adaptation. These processes are found in all children and continue to operate throughout the life span. Children are changing schemes, or cognitive structures to make sense of the stream of events in their environment. Younger children think qualitatively in a different way than older children. This led Piaget to develop his "Stage theory", which is described below.

### 1.1.3. Stages of Cognitive Development

After interviewing many children, Piaget concluded that there are four recognisable stages of cognitive development. The cognitive development of children follows a circumscribed order, but the ages at which these stages are attained differ widely from one child to the other. Piaget himself was not concerned with particular ages, but with the sequence in advancement of thinking across a broad set of problems. Each stage is divided into substages. It is, however, beyond the scope of this paper to enter into a detailed description of all these substages.

◎ *Sensori-motor Stage (0-2 years)*

Infants and children up to the age of two years acquire understanding primarily through sensory impressions and motor activities. Infants develop schemes primarily by exploring their own bodies and senses. After they have learned to walk, and manipulate things, toddlers get into everything and build up a sizeable repertoire of schemes involving external objects and situations. This stage comprises the maturation from new-born, who focuses entirely on immediate sensory and motor experiences, to toddler who possesses a rudimentary capacity for symbolic thought.

◎ *Pre-operational Stage (2-7 years)*

The thinking of pre-school children is based on comprehension and use of symbols, such as words. This permits them to benefit much more from past experiences. The rapid increase in language results from the growth of the symbolic function. Even though their thinking is much more sophisticated than that of one- and two-year-olds, children at this stage are identified to have two severe limitations in their thinking: namely *egocentrism* and *animism*. The pre-operational child has a "self-centred" attitude (egocentrism). He finds it difficult to understand that other people can look at things in a different way as discussed in paragraph 1.1.2.

Furthermore, Piaget observed in this stage instances of animistic thinking. This means that children frequently attribute feelings and intentions to inanimate objects: "Teddy is sick", "The moon follows them". In this period, the child has problems to distinguish between fantasy and reality.

Another aspect of the child's thinking in this stage occurs around the age of 4. At this age, the child begins to develop the mental operations of ordering, classifying and quantifying in a more systematic way. In developing these operations he is not aware, however, of the principles that form the basis of these operations. The development of these mental operations is not advanced enough. He cannot explain why he has done these operations, nor can he carry them out in a fully satisfactory way. For example, when children are asked to arrange sticks of different sizes in order of length, some of them were totally incapable of doing the task, some arranged a few correctly but could not sustain the complete ordering; others would put the small ones in a group and all the larger ones in another; another more advanced response was to arrange the sticks so that the tops were in the correct order even though the bottom was not. In short, it was observed that the child at this stage is not capable of ordering more than a very few objects.

Furthermore, the child has problems with mastering *part-whole relations*. For instance, when children are shown a bunch of seven roses and three tulips they would very likely answer that there are more roses than flowers when asked by the experimenter.

*Conservation* is the area in which the thinking of the child in this stage has been investigated most. A child at this age experiences problems in comprehending this concept. For example, if the row of flowers in the figure below is made shorter by bunching them

together (see: B), the child thinks that there are less flowers. Even though when the flowers are moved back to the first position (see: A) so that there is one flower for each vase, the child still thinks that when the appearance of the row alters, the number of objects in it changes.

**Figure 1.1.** *A test of conservation of number*
*(adapted from Piaget & Szeminska, 1941)*

Three notions underlie the conservation principle: The first one is *compensation*. This is the understanding that one attribute, for example the length of the row, is compensated by another attribute, like the increase of density of the flowers; The second notion is *reversibility*. This is the comprehension that operations can be mentally reversed. (For example: the comprehension that changes in the density of a row of flowers can be negated by reversing the process.; i.e. that the flowers can be put back where they were in the first place). The third notion is *identity*. This is the understanding that the total arrangement must still be the same since nothing has been added or taken away.

Because children in this stage do not yet engage in operational thought, Piaget uses the term *preoperational* to refer to the thinking of two- to seven-year-olds.

◉ **Concrete Operational Stage (approximately 7 to 12 years)**
Children over the age of seven are usually capable of mentally reversing actions, but their strategies are concrete because in this stage, the child can apply them only to objects that are actually present or that he has experienced concretely and directly. For this reason, Piaget describes this stage as that of *concrete operations*. The child is now able to reason in terms of concepts but only when the objects are concrete. The objects themselves don't have to be present anymore. The nature of the concrete operational stage can be illustrated by the child's mastery of different kinds of conservation. The child can co-ordinate more than one aspect. In the conservation of number, the child is capable of dealing with length and density. In the conservation of quantity, the child is capable of considering both height and width. The child increasingly understands transformations and can reverse his thinking process. Also, the child is capable to classify and order objects, which posed the pre-operational child for problems. The child now understands that the total arrangement must still be the same when nothing is added or taken away. Furthermore, the child is coming to realise that someone else's viewpoint is different from one's own. Thus, there is a gradual declination of egocentric thought.

◉ **Formal Operational Stage (approximately 11-15 years)**
When children reach the point of being able to generalise and to engage in mental trial and error by thinking up hypotheses and testing them "in their heads", Piaget says they have reached the stage of *formal operations*. The child is capable of reflecting internally on his operations. The child no longer depends on the concrete existence of things in the real world, instead, it is now possible to reason in terms of verbally stated hypotheses, considering the logical relations among several possibilities or deducing conclusions from abstract statements. There is a transition from acting on internal operations to a reflection on these operations.

An example of a formal operational task is to generate all possible combinations or permutations of events, for example: make up all the possible words from the letters A, S,

E, T, M. At the formal operational level this will be done systematically, in a logically ordered way, for example considering first all combinations of two letters, then three letters, and so on. Below this level, the attempt will be unsystematic and disorganised.

Piaget has identified four central factors of development: maturation, experience with objects, social experience and equilibration. Maturation refers to the development of the brain. Experience with objects are important for the development of schemes and mental operations. Social experience is important for transmitting knowledge (through formal and informal instruction), for teaching role-appropriate behaviour and values, and for encouraging the shift from egocentric to decentered perspectives. Equilibration is a process of achieving a balance (or equilibrium) between external disruptions and the activities of the organism. These four aspects account for the cognitive growth in each stage of cognitive development. In chapter 3 they will be discussed in terms of how their impact on the development of deaf children.

## 1.2. The Vygotskian Approach

Vygotsky attributed socio-cultural issues a central place in intellectual functioning. Briefly, his psychology presents a socio-cultural analysis of human development. He argues that the same biological or environmental factors may have very different effects. This depends on the people among whom the child grows up, both in terms of the culture of those people and their characteristics as individuals. The ideas of Vygotsky (1896-1934) can not be discussed without taking the cultural historical context into account. Hence, a brief description is followed below about the historical context in which he developed his ideas.

### 1.2.1. The Socio-Cultural and Historical Context

Vygotsky was influenced by the political philosophers Marx and Engels. Marx argued that humans have gained increased control over the environment by means of inventing and using tools. According to Marx, the social process of production is a central part of being human. Throughout history, people have worked together to reach their goals. Thus, human nature cannot be described without an appreciation of its social and historical context. Human capacities are changed and shaped by historical developments, especially technological development. Due to improvements in technology tools were developed for dealing with the environment. Consequently humans became increasingly aware of the properties of objects, developed ways of co-operating and communicating, and developed capacities for planning. History has shown that human thought changed as a function of technology, hence it will continue to change as human technology changes.

### 1.2.2. Basic Principles of Vygotsky's theory

Vygotsky created an ambitious model of development based on a socio-historic approach. Society was seen as essential for the course of human cognitive development. Vygotsky extended the view of Marx that people gain increased control over the environment by inventing and using tools, by stating that besides the fact that humans developed physical tools, they developed psychological tools (for example: speech, writing, memory) to assist their own thinking and behaviour as well. Vygotsky referred to these tools as "signs". In understanding human thinking one needs to investigate the culture's sign systems, like writing and speech. According to Vygotsky, children use these systems in a continuous interaction with the environment. Besides the "natural line" of development (i.e. development as a result of maturation) the growth of mental structures is strongly influenced by the "cultural line" of development.

> The growth of the normal child into civilisation usually involves a fusion with the processes of organic maturation. Both planes of development-the natural and the cultural-coincide and mingle with one another. The two lines of change interpenetrate one another and essentially form a single line of socio-biological formation of the child's personality. (Vygotsky, 1960)

Cultural sign systems are viewed as very important in cognitive development. For Vygotsky, human thinking can not occur without speech and other sign systems.

Sign systems are mental functions which are culturally derived and have their onset in the interaction between the child and another person. Each of these functions appears twice in a child's development: first as shared between the child and the adult (social plane) and then within the child (psychological plane). This is termed: the general genetic law of development:

> Any function in the child's cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an inter-psychological category and then within the child as an intra-psychological category. (Vygotsky, 1934)

Social interactions become internalised. This process characterises the development of all « higher mental processes ».

> [Higher mental functions'] composition, genetic structure, and means of action [i.e., forms of mediation] - in a word, their whole nature - is social. Even when we turn to mental [i.e., internal] processes, their nature remains quasisocial. In their private sphere, human beings retain the functions of social interactions. (1981)

By means of the process of *reconstruction* children encounter the same situations repeatedly as they grow, but each time they can deal with them at a higher level and reconstruct them.

In the view of Vygotsky, learning is achieved through co-operation with other people in a whole variety of social settings - with peers, teachers, parents and other people who are important for the child. Learning also comes through the "symbolic representatives" of the child's culture - through its art and language, play and songs, metaphors and explanation. Development as a learner reflects the child's cultural experience; in turn; significant cultural experiences become internalised into the structure of the child's intellect.

### 1.2.3. Stages of Cognitive Development

Vygotsky's theory stresses the role of interpersonal processes and the role of society, in providing a framework within which the child's construction of meaning develops. The interactions between the individual child, the significant people in the immediate environment and the culture can be represented diagrammatically.
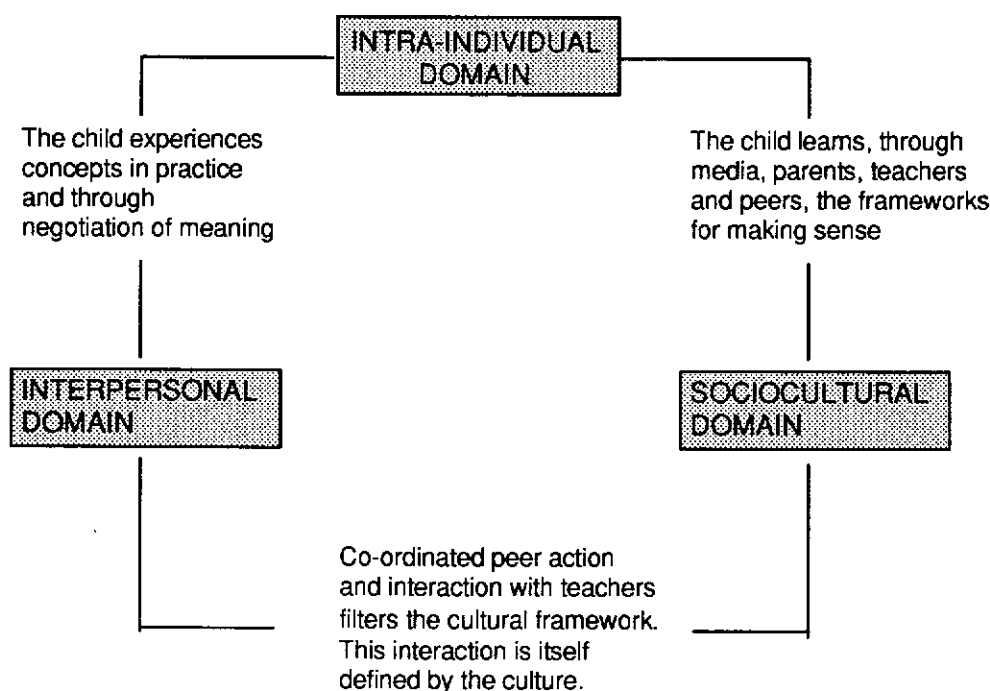
**Figure 1.2.** *A model for the relationship between the intra-individual, interpersonal and social domains (adapted from Haste, 1987)*

According to Vygotsky, the cultural development of the child goes through four phases or stages:

❷ *The stage of natural, or primitive behaviour*

This stage is characteristic of pre-school children. The child relies on his natural mental processes and does not use the available cultural means.

❷ *The stage of naive psychology*

In this stage, the child does use the cultural means presented to him, but has difficulties in understanding their function.

❷ *The stage of external use of cultural means*

In this stage, the child understands the possibility of active, instrumental use of cultural means.

❷ *The stage of internal use of cultural means*

The last stage, the external use of instruments is replaced by internal mental activity.
As a general rule the cultural development of the child proceeds from no use, via external use, to internal use of cultural means.

Vygotsky argued that internal self-regulation has its roots in the external social regulation of interactions. The acquisition of a culturally created means should lead to the development of an interiorised form of psychological action regulation. He called this process 'interiorisation'. For example language and speech seem to be cultural products that the child acquires in social intercourse, and they produce verbal thinking as a new, interiorised form of action expression.

Vygotsky argued that it is not possible that children develop abstract thinking without instruction in abstract sign systems. Each child has a *zone of proximal development* in which

16

development proceeds through children's participation in activities slightly beyond their competence (in their "zone op proximal development") with the assistance of adults or more skilled children (Vygotsky, 1978; Wertsch, 1979).

The child is brought into the intellectual life of the community and learns by jointly constructing his understanding of the events in the world. Thus, children learn from other people more competent than themselves. Subject matter should be presented one level beyond the child's existing level so that it provides some challenge; but not too far ahead, so that it is still comprehensible. The presentation is then within the Zone of Proximal Development and the child can accomplish something he could not do entirely by himself and learn from the experience.

In collaborating with somebody else who is more knowledgeable the child is given more information about a topic. Besides this, it confirms those aspects of the issue which the child understands. Furthermore, the co-operation enables the child to move on. The co-operation with the more knowledgeable person has a maximal effect when it is contingent upon the already existing repertoire of skills and wisdom. In other words, when it is within the Zone of Proximal Development. In challenging the child's level of understanding he will be more likely to learn new things effectively without the experience of failure. In a learning situation the complexity of subject matter needs to be constructed so that the child is not asked to climb too much. One not only has to take account of the child's existing level, but also of how far the child can progress with help.

In sum, for Vygotsky, the concept of culture offers a way of linking the history of a social group, the communicative activity of its members and the cognitive development of its children. The three themes which characterise Vygotsky's conception of cognition are: developmental analysis, the social origins of mind, and the sign-mediated nature of thinking (Wertsch, 1985). Developmental analysis provides insight in psychological processes. The concept of social origins of mind is based on the assumption that higher psychological processes only appear in the interaction between individuals. Semiotic mediation is proposed to explain the need for a differentiation between language as a system of abstract signs and the ways that such signs are used for communication between individuals.

The three themes, described above, will be discussed in section 3.3, where they will aid in conceptualising the development of deaf children.

# Chapter 2. Contemporary View of Cognitive Development

Psychologists have begun to explore ways in which the insights from both Piaget's and Vygotsky's perspectives might be combined. This has led to a growth in developmental social cognition research which emphasises the importance of the child's social interactions. Piagetian researchers such as Doise, Mugny & Perret-Clermont, (1975), Perret-Clermont, (1976) and Doise and Mugny (1984) in Switzerland, but also many other researchers have specified the types of co-operative context in which children's understanding is progressed. They state that there is a causal relation between social interaction and the development of social cognition (social understanding). Social cognition is assumed to be achieved by the constraining and the facilitative factors of social interaction. Conflict of views and perspectives can encourage children to re-think their initial considerations. The researchers mentioned above have demonstrated that in some instances children solve problems more effectively when they work in dyads or in small groups, then when they work alone. It looks as if social interaction enables them to see the solution. The starting point is on viewing conflict and confrontation as the "triggering" process for cognitive growth, whereby one stage of socio-cognitive development might lead to the qualitatively distinct next stage. In other words: when the child experiences conflicting views, this stimulates disequilibrium which the child is motivated to resolve. The social process of interacting with peers creates a frame or "scaffold" which helps each child to reconstruct his or her ideas.

This interpretation by the researchers mentioned above starts from a Piagetian standpoint but takes account of the social context of peer interaction within which the child operates. The following paragraphs of this chapter give a more detailed description of how research in this field has developed. I will describe mainly the research carried out by Prof. A.N. Perret-Clermont and her Swiss colleagues. This sturdy curtailment is not to say that they work in isolation. There is an intense and fruitful collaboration with others in the field like: Carugati, Gilly, Light and Rijsman.

## 2.1. The social construction of meaning: introduction

Although the approaches of Piaget and Vygotsky have had a major impact in psychology it is since the '70s that systematic empirical investigations are carried out of how experimentally induced variations in the social environment affect observable cognitive processes. The late onset of research in this field due to the ignorance of causal links between individual and social factors, was caused by the fact that social and cognitive factors were seen as "two faces of the same reality." There was a growing interest in the specificity of cognitive and social processes that permits the transfer, creation, and acquisition of knowledge in cultural settings. The centre was on explicit accounts of the influence of different social aspects of the human environment on the individual's development and an understanding of how the individual can actively manipulate the social and physical features of his environment and achieve knowledge from these experiences. One was not longer satisfied with the assumption that there was a causal link. This awareness has set the stage for a series of investigations undertaken by Perret-Clermont and others, which were called 'The first generation of studies'. In these studies the primary concern was with how cognitive performances are affected by social factors and how social resources are actively used to solve problems. Furthermore, they aimed at identifying how social states urge subjects to reconsider their responses or strategies and how, in turn, this fact modifies the development of their individual cognitive resources.

During the course of these investigations the researchers became increasingly aware that comprehension of cognitive development is more or less a what I would suggest to call "metacognitive enterprise". In other words, the assumptions of the psychologist, his theories and his presuppositions, play a major part in the determination of the focus of his observations and methods of data collection. There appeared to be a large gap between the experimenter's understanding of what was happening and the subjects' understanding of

the same phenomena. In tracing the nature of this gap, subject's metacognitive reflections were studied. It appeared that their cognitive activity was not so much a conflict with the underlying aspects of the task, (as was hypothesised in the first generation studies) but an attempt, on the one hand to give meaning to the persons and the tasks with which they were interacting, and on the other hand, to make sense of the processes that they were undergoing.

These observations led to the second generation studies. These studies were principally concerned with a close investigation of the specific aspects of social interaction themselves. Social interactions were no longer considered as causal factors evoking cognitive alterations within the subject, but as the instrument mediating the transmission of meaning from the person who settles the problem and requires cognitive performances from the subject who tries to comply with these demands.

This research has pointed to the limited value of the notion of context-free or culture-free psychology (a long-lasting debate for decades) and indicates new directions for the analysis of teaching-learning processes. Not only the objective characteristics of the social and physical environment in which children develop their cognitive resources have to be taken into account, but also the meaning that children assign to these objective environmental properties.

In the next paragraph the first generation of studies is described. These studies are concerned with the antecedents and consequences of social interactions on the individual's cognitive behaviour. In paragraph 2.3, the second generation studies will be discussed, in which the unit of analysis shifts to the social interaction itself.

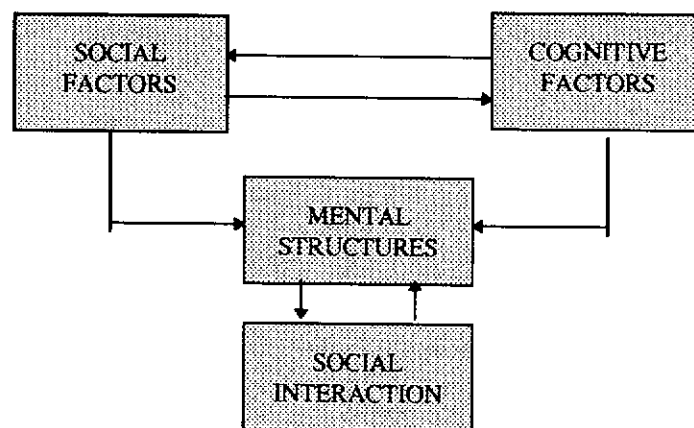## 2.2. The First Generation Studies

The first set of studies was aimed at an identification of the impact of different kinds of social factors on the individual's cognitive development. Piagetian tasks of quantities and representation of spatial relations were used in order to investigate this impact (Doise & Mugny, 1984; Doise, Mugny & Perret-Clermont, 1975; Perret-Clermont, 1980; Perret-Clermont & Mugny, 1985; Perret-Clermont & Nicolet, 1988; Perret-Clermont & Schubauer-Leoni, 1981). The basic paradigm of these studies consisted of a pre-test to evaluate children's operatory level followed by an experimental session (usually a week later) in which subjects underwent different experimental treatments (e.g. solving the task alone or with peers, observing an adult model, or being confronted by a contradictory judgement given by an adult or another child). A week later, a post-test (similar to the pre-test but with additional items to test generalisation) assessed progress made by the subject. In this paradigm, social factors were considered as independent variables and cognitive performance as dependent variables. The results of this line of research were as follows:

@   In some circumstances, children who were initially non-conservers on a Piagetian conservation task during the pre-test are likely to progress on the post-test if an adequate experimental session gives them the opportunity to interact with peers effectively. Such progress does not occur for control group subjects who have had no peer interaction.

@   The number of participants in the experimental peer group does not directly inducecognitive progress. This progress cannot be explained in terms of compliance to amajority position. Those subjects who show evidence of progress in the post-test, generate "new" arguments in their discourse (i.e., different from those heard from their partners during the experimental session).

@   Irrespective of the type of social interactions; confrontation with a peer of the same cognitive level or a more advanced or a less advanced level (Perret-Clermont, 1980), it was not necessary to confront the child with the correct solution during the experimental session. Even if the subject's partner, in Piagetian terms, has not

reached the concrete operational level, the experimental session of social interaction can still be fruitful for the subject to progress to this level on the post-test. For this to happen, a confrontation between the subject's incorrect response and a different (although not necessarily correct) point of view is essential. Therefore, it seems that it is the socio-cognitive conflict caused by the contradiction of minimal two responses that is the source of the restructuring of the subject's thought. The nature of this conflict is *socio*-cognitive, because the presence of another person forces the subject to take into account that there exists another cognitive response which is different from his own. It is socio-*cognitive*, in the sense that the aim of the confrontation is not debating the interlocutor's identities, their drives, or any other affective or emotional aspect of the interaction, but only the understanding of the conceptual issues involved in the task (Perret-Clermont, Perret, & Bell, 1991).

It appeared that socio-cognitive conflicts do not always lead to developmental progress as measured in the post-test. For progress to occur, at least two conditions must be accomplished. First, the subjects must have the necessary cognitive foundations to profit from a given social interaction. Second, social confrontation is effective only if the gap between the partners' cognitive skills is not too wide (Perret-Clermont, 1980; Doise & Mugny, 1984). That is, certain cognitive skills are needed for the child to profit from the socio-cognitive conflict, which, in turn, strengthens his or her competencies as can be measured in the post-test.

These results can be integrated in an interactionist and constructivist model of cognitive development like depicted below:



**Figure 1.4.**    *interactionist and constructivist model of cognitive development (based on the "first generation studies")*

In this model, social and cognitive factors successively bring about one another which reveals the gradual development of mental structures. New mental organisations enable the subject to engage in new social interactions, which, in turn, cultivate new mental organisations.

The first generation studies were hampered by some observations that could not be explained by this model of development.

Sex and social class differences have been repeatedly observed in pre-test performances. These differences sometimes disappeared by the post-test under certain types of experimental conditions (Nicolet, Grossen, & Perret-Clermont, 1988; Perret-Clermont & Mugny, 1985; Perret-Clermont & Schubauer-Leoni, 1981; Perret-Clermont, 1980). According to Piaget's theory, this is not possible, because Piaget sees development as following a slow, clearly defined process in which maturation and personal experiences (activity) has an important role. So, it was wondered what it is, that actually changes in the

subject's cognitive level. Is it his cognitive level of competence or his understanding of the type of thinking that he is expected to display in this context?

Doise, Dionnet, and Mugny (1978), Donaldson (1978) and others reported the finding that the subject's performance level for a given operatory task can vary according to the nature of the task or the type of the instruction given. An example of this is presented by an experiment of McGarrigle and Donaldson (1974), which has become known as the 'naughty teddy' study, a variant of Piaget's traditional number conservation task. Four-and five-year-olds were asked whether two rows of marbles arranged in parallel lines contain the same or a different number. The children agree that the number of marbles is the same when the length of the rows is identical and each marble is opposite another. Then, a 'naughty teddy', which was manipulated by the experimenter rushes in and lengthens one of the rows of marbles, just as in the standard conversation task. The child is then asked whether the longer row contains the same or a different number of marbles than the shorter row. Most children now answer correctly that the number of marbles has not changed. However, they fail to conserve under the standard testing conditions of this task. It was wondered, then, (Light & Perret-Clermont, 1989) to what extent these tests assess the subject's operatory level? Or do they actually test a subject's communicative competence?
The second generation studies were aimed to shed a light on these questions.

## 2.3. The Second Generation Studies

Thusfar, the child's cognitive responses had been considered as related to social factors, which were conceived as independent variables. The unit of analysis had been the behaviour of the individual. The focus now was shifted towards the social interaction itself. This was studied in two different contexts:
the setting of diagnostic psychological tests and the context of teaching, learning and assessment at school. In these contexts important questions were: How are the relationships in these encounters constructed? How is the task mutually constructed? How do the interlocutors manage to establish a common object of discourse? Who regulates the dialogue, and is this regulation social or cognitive?

In exploring these questions, it was found, among others, that for certain social groups, some experimental conditions had a greater impact on subject's task performance than did others (see for a detailed description of one of such experiments: Perret-Clermont & Schubauer-Leoni, 1981). In sum, these results and other (Nicolet, Grossen, & Perret-Clermont, 1988; Donaldson, 1978; Light, & Perret-Clermont, 1989; Rijsman, 1988) imply that the reported effects of task presentation and experimental instructions on subjects' performance are likely to vary as a function of sociological characteristics.
It was suggested that subjects obtain meaning from the experimental social history that they have previously undergone (prior experiences and interpersonal relationships within the test and social interaction situations). See for a more detailed account: Schubauer-Leoni, Perret-Clermont, & Grossen, 1992; Nicolet, 1995.

Results of the research on the effects of the task presentation led to a series of studies which were centred on children's perception of the testing situation itself to understand better what elements play a role in the elaboration of children's responses and what social knowledge is required to interpret adults' discourse and, hence, succeed at the task. The experimental situation is entirely new for the child. If one takes for example the "conservation of liquids", the pre-test begins with a strange adult who tells the child that "we are going to play a game together". However, this 'game' has nothing in common with the kind of games the child is familiar with. Thus, the situation can look quite dubious for the child.
Furthermore, it was found that, on the one hand, not all subjects are necessarily confronted with similar tasks or procedures, even if procedures are rigorously standardised in the view of the tester. On the other hand, in practice, the psychologist has to go beyond a standardised testing script to make the subject's mode of thinking converge towards his or

hers, using various socio-cognitive strategies. That is, they have to share a common frame of reference, or "intersubjectivity" in order to succeed on the task. When faced for the first time with an ambiguous testing situation, the child will try to decode the adult's tacit assumptions concerning the definition of the situation, their roles, and the aim of the discussion. All this will be done in order to reach a state of intersubjectivity.

Individual testing can thus be considered as a complex social interaction in which the subjects apply a wealth of social knowledge and skills including the outcome of the task and the regulation of the social interaction using interactive strategies.

Concerning the other context, that of the school, results led to the same conclusion, namely, that competence depends on social constructed meanings and is distributed within the context. The meaning is passed by the setting, the institution in which the encounter takes place, the participants' discourse and attitudes, their sense of social identity, the objects manipulated, and the type of interpersonal relationship established.

Summarised, what were traditionally considered intrapsychic logical processes are also social events with their past and present history within specific institutional and sociocultural contexts.

For a better understanding of the utilisation of children's socio-cognitive skills in interaction one must take into account the creation and transmission of meaning and knowledge in social interaction, the establishment of interpersonal relationships, the construction of the context and the elaboration of intersubjectivity. The empirical part of this paper, starting with chapter 4, deals with this last aspect: the notion of intersubjectivity. This will be applied to interactions between an experimenter and a deaf child in a test-situation.

Chapter 3 is centred on deaf children and perspectives on their development.

# Chapter 3. Perspectives on Deafness

Research on deafness has brought about a long history of opposing findings.

The empirical facts (or what we believe to be the facts) about deafness and development are overcastted by methodological problems and contradictions. One such difficulty is that of matching deaf children with suitable (usually hearing) control groups for the aim of determining the outcomes of some deafness-related variable. Another problem concerns the selection of experimental materials or contexts that are similarly meaningful or well-known to both samples of deaf and hearing subjects. Such controls are important if one wants to interpret the assessments of interests valid and reliable. However, research into questions of substantial importance appears to have been conducted now and then with little attention for controlling significant dimensions of the investigatory setting. The difficulties in defining the significant dimensions are also very common: How does one match deaf and hearing children? Need they be matched for chronological age, IQ, grade level, or language ability? Do we employ non-verbal tests or simplified materials to preclude bias, or do such manipulations simply bring biases of their own. How far can we generalise from deaf children who are orally trained to deaf children who are manually trained? Also, how far can we generalise from deaf children to deaf parents to deaf children from hearing parents? These problems are inherent in almost any attempt to conduct research concerning deaf children.

The first paragraph of this chapter is concerned with some important aspects about the nature and scope of deafness. This introduction is essential for understanding the development of deaf children, therefore it is considered at the beginning of this chapter. In paragraph 3.2. a Piagetian view on the development of deaf children is given and in paragraph 3.3. a Vygotskian view on deaf children's development is described. A historical perspective on deafness is described in paragraph 3.4. This concerns the (societal) issues: education, language, personality, cognition and research. In paragraph 3.5. a description of the present perspective on deafness will be described.

## 3.1. The Nature and Scope of Deafness

At the beginning, I want to emphasise that any effort to provide complete and exact descriptions of deafness and deaf people is unlikely to succeed. The deaf population differs widely and, in some ways this deviation is perhaps even more widely than the population of normally hearing people. As far as the deaf population is concerned, there is variability contributed by differences:

1. in whether deafness is congenitally or accidental;
2. in physiological factors related to their deafness (e.g., degree and quality of hearing loss, possible accompanying impairments);
3. in whether deaf children are born into deaf or hearing families;
4. in the extent of linguistic and non-linguistic interpersonal experience;
5. in the quality and type of education they receive.
   (Marschark, 1993).

These variables are in addition to the normal sources of variability that can induce development. This results in a more diverse population. Within this population there are individual and socio-cultural differences as well.

Concerning the individual differences, a distinction can be made between prelingual and postlingual deafness. Children who are hereditary deaf or who lose their hearing before the acquisition of language (prelingual) are in a totally different position facing the hearing world than those who became deaf after the development of spoken language (postlingual). Therefore the age of onset of deafness is very important.

Another issue on which deaf children differ relates to the degree of hearing loss. Characteristic, hearing loss is classified as moderate, severe, or profound like indicated in the table below:

| TERM | DEFINITION |
|---|---|
| Moderate | Hearing loss of 40-60 dB, with substantial difficulty discriminating sounds in normal conversation. |
| Severe | Hearing loss of 60-80 dB, resulting in significant and consistent disruption in communication. May be unable to converse outside significantly limited interchanges. |
| Profound | Hearing loss greater than 80 dB, resulting in extreme difficulty in conversation; unlikely to understand speech to a useful degree. |

Table 3.1.:    Terms used to describe the severity of hearing-impairment
(from: J.P. Braden, 1994)

In addition to the degree of loss, the pattern of loss is also an important aspect.
That is, at what frequencies the losses occur. The most important frequencies for the understanding of speech are in the mid-frequency range of 500, 1000, and 2000 Hertz. In regard to the causes of deafness it is recognised that different etiologies are differently associated with other physical and mental handicaps. Emotional or behavioural problems, visual defects, and perceptual motor defects are the predominant additional handicapping conditions. In turn, these additional handicaps can result in further disabilities for the deaf child in areas related to language, cognition and socio-emotional development.

Concerning the socio-cultural differences, there are variations in families with deaf children. The hearing-status of the deaf child's parents can summarise a large number of family differences. Only about 10% of deaf children have parents who are also deaf More often, the deaf child is born into a hearing family that, before the diagnosis of the child's deafness, had little or no knowledge about hearing loss. Apart from this, it is known that deaf children raised by hearing parents receive less exposure to language than their normal-hearing peers (Braden, 1994). As such they are in a totally different position, facing the world, compared with hearing children.

## 3.2. A piagetian view on the development of deaf children

In this paragraph the four central factors of development which have been described in paragraph 1.1.3. will be discussed in terms of how they act on the development of deaf children.

***Maturation:***
Apart from any neurological problems linked to the etiology of deafness, it is very well possible that deaf and hearing children's brains develop different patterns of organisation as an implication of their early experience. Questions in this research area are: If deaf children do not use the auditory cortex for hearing, does this part become mobilised for vision or other functions? If language is normally localised in the left hemisphere and visual-spatial abilities in the right hemisphere (at least for right-handers), what happens when language is visual-spatial as for sign language?
Investigations of cerebral organisation in deaf children are rare, but the studies which have been conducted generally support the results obtained with neurologically intact adults implying greater heterogeneity and less lateralisation in deaf than hearing individuals. More research, however, is needed to determine the effects of these findings.

## Experience with objects:

Sound, as well as vision, has important consequences for the quantity, quality, and effectiveness of the child's experience with objects. The deaf child is often withhold of knowledge about the sound-making qualities of objects and actions. Furthermore, insofar as noises made by objects and by actions upon objects urge the child toward exploration, the absence of an auditory channel might be expected to limit the motivation for exploration and, hence, retard cognitive development. Many of the observations made by Piaget suggest that sounds are important for the child's sensorimotor exploration. The following example clearly indicates that auditory feedback supplies the child with essential information about the nature of objects, and acts as an important trigger for actions upon objects.

At three months, Laurent grasps a paper knife which he sees for the first time; he looks at it for a moment and then swings it while holding it in his right hand. During these movements the object happens to rub against the wicker of the bassinet. Laurent then waves his arm vigourously and obviously tries to reproduce the sound he has heard, but without understanding the necessity of contact between the paper knife and the wicker, and, consequently, without achieving this contact otherwise than by chance. (Piaget, 1952)

This example illustrates how audition may play an important role in encouraging exploration and in the generalisation of schemes.

Deafness may thus lead to indirect restrictions in the child's environment because of reduced exploration on the part of the child. Restrictions in the environment also occur as a direct consequence of deafness. The absence of audition prevents the individual from receiving information from distant locations such as the street. Similarly, there are reductions in information because the deaf person cannot receive information from two channels simultaneously, whereas the hearing person can process auditory information while attending to a visual stimulus.

The environment may also be restricted for the deaf child as a consequence of caretaking practices. Within the family setting, parents are likely to overprotect their deaf children (for safety reasons), In doing this they reduce the range of experiences and objects available for manipulation. According to Piaget this can have negative effects on the cognitive development of the child.

## Social experience:

As was discussed in chapter 1, social experience is important for transmitting knowledge, for teaching role-appropriate behaviour and values, and for encouraging the shift from egocentric to decentered perspectives. For the deaf child, these processes may be seriously burdened by the lack of appropriate role models and by shortcomings in the quantity and quality of communication.

@     *Role models:*

Traditionally there have been few deaf adults available as models for the developing deaf child. Only about 10% of deaf children have deaf parents. Deaf teachers are also rare. There are not many deaf teachers active in schools for the deaf on the assumption that deaf teachers would be less able to provide effective instruction in speech. This matches with the what I call the 'oral education policy' (see paragraph 3.4 of this chapter).

@     *Quantitative deficiencies in communication:*

Many of the social deprivations of the deaf child may be traced to problems in communication between adults and children, and among peers. There are delays and quantitative decreases in communication. For the 90% of deaf children who have hearing parents, there is typically no system available for communication in early childhood other than primitive, iconic, home-made gestures and non-verbal communication. Even when the child enters school, oral skills develop often slow and oral skills rarely develop adequately enough to engage in meaningful communication with those who have not learned some

form of manual communication. One of the most likely effects of the delay and reduction in the communication is a diminishing in the transmission of information. Deficits in the beginning, depth, and quantity of the communication between adult and child can be reduced considerably if parents and significant others learn and use some form of sign language.

Communication among peers may also be reduced in deaf children. Stokoe (1960) found that deaf children typically have fewer playmates than their hearing peers and engage more in solitary play.

@ *Qualitative deficiencies in communication:*

Three areas of qualitative deficiencies in the communication with deaf children can be identified.

The first area concerns the communication between adult and child. This communication tends to be more didactic, more controlled and less mutual. In comparison to hearing children, deaf children of hearing parents experience more directives or orders when interacting with their mothers. Compared to hearing mothers with hearing children, mothers with deaf children were less creative, less flexible, and showed fewer signs of approval. In classrooms, overcontrol emerges in the form of both frequent adult questions, usually demanding short, factual answers, and a high incidence of adult "repair"-demands for clarification and requests for imitation (Wood, Wood, Griffiths, & Howarth, 1986).

The second area concerns the deep, semantic aspects of communication. These aspects tend to be distorted or lost by too much attention to the surface features of the interaction. Parents were often encouraged by speech therapists and educators to practice speech and language lessons at home. But this can interfere with normal parenting functions. The emphasis on linguistic structure is even more salient in the classroom. Teachers often correct the form of children's language during interactions and instructions. But this may cause children to lose interest in the subject matter, lose their train of thought, and may lead to the attribution of an unpleasant affect to communication.

The third area concerns the expectations and goals. These may be dysfunctional for optimal development. Highly directive, intrusive communication of the kind described as common in classroom and family settings is likely to communicate an evaluation of helplessness to the deaf child and to discourage independent thinking. This is consistent with a tendency to infantalise handicapped children and to set lower goals for them.

### Equilibration:

To counterbalance for situations or effects that do not meet current operational structures, existing schemes are augmented and integrated through the equilibration process. While equilibration, itself, may be believed to function normally in deaf children, the push for cognitive restructuring is probably prolonged because of a decreased possibility for external disturbances. However, recent research carried out by Peterson and Peterson (1990) and a replication of this research carried out by Perret, Prélaz & Perret-Clermont (1993) concerning the handling of socio-cognitive conflicts in deaf children have shown that deaf children are not ineffective to interact with each other when a task presents itself, but that they also succeed to profit from conflicting points of view, that is to say to make progress at a cognitive level as a result of time spent working co-operatively in a dyad.

## 3.3. A Vygotskian view on the development of deaf children

In this paragraph the three central factors of cognition: developmental analysis, the social origins of mind, and the sign-mediated nature of thinking (Wertsch, 1985) which have been described in paragraph 1.2.3. will be discussed in terms of how they act on the development of deaf children

### Developmental analysis:

Vygotsky asserted that to understand any psychological process, one must understand its origins and the mechanisms by which it changes. He distinguished four levels of developmental analysis:

@     *Phylogenesis:*

An analysis of the development of the species (phylogeny) permits us to understand what distinguishes humans from other animals. For Vygotsky, the difference between our elementary and higher psychological functions is of essential importance. Elementary psychological functions involve those basic processes (e.g. attention or memory) that identifies humans, biologically, as a species. These processes are environmentally driven and beyond the control of the individual. Higher psychological functions are brought about by historically evolved, culturally shaped, and socially mediated tools and signs. Higher functions permit the individual to control the environment and to control their own behaviour. Vygotsky believed that the transformation of processes such as those associated with memory from elementary to higher psychological functions is made possible through individuals' communicative acquisition of divers sign systems, most especially language. In this context, sign and sign systems involves arbitrary or conventional sets of symbols, utterances, or gestures used to express or communicate an idea. Therefore, a sign system can be oral, manual, written, mathematical, etc. Misinterpretation concerning deaf individuals as intellectually inferior or limited to concrete forms of thinking may result from a failure to understand the extent to which the development of higher psychological processes results from the communicative use of language (Pintner & Patterson, 1917; Myklebust, 1964; Lane, 1988).

@     *Cultural history:*

Cultural history refers to the sort of transformations that occur in an individual's thinking as a consequence of historical change and cultural variability in a society's institutions, tools, and practices. Vygotsky postulated that understanding institutions (e.g., the family, the school, deaf communities) and their associated practices is important in grasping the nature of thinking of the people in that society. Thus the advent of schooling, with its emphasis on intentional, taught learning of a literate kind, could be expected to exert influence not only on what we think but also on how we think. Vygotsky stated that the study of a society's tools and how they are actually used is critical to understand the people's thinking and development. Furthermore he differentiates between material tools and psychological tools (mathematics, language). Vygotsky believed that while material tools such as the hearing aid could produce marked changes in the environment and thus in our thinking, it was through appropriation and use of sign systems that we came to control and regulate our behaviour with respect to that environment (Wertsch, 1983). It is with respect to the development of manual sign systems (i.e. psychological tools) and their associated practices in communication both with and among deaf children that one finds that cultural-historical transformations have taken place. For example, manual sign systems have changed over time. They also present cultural variability at any given point in time. The extent to which these changes occur (over time and across cultures) has implications for how deaf people's thinking can alter as well over time and across cultures, and even within a culture. Linguistic analyses of both spoken and signed languages have revealed that the same principles rule both kind of languages, although one is perceived auditive and the other visual. However, the transformation from an oral to a manual system of language representation may have brought a corresponding shift in how deaf individuals are able to think.

@     *Ontogenesis:*

Ontogenesis refers to the development of the individual over the course of the life-span. Such development is understood to result from the joint interaction of natural (i.e., biological) and cultural-historical factors. Vygotsky assumed that the natural and cultural lines of development combine, resulting in the rise of higher psychological functions (e.g., sign systems) that are not predicted by either alone.

@ *Microgenesis:*

Microgenesis involves the modifications in a psychological process that are observed to take place over relatively short periods of time (e.g., a single instructional episode). Microgenesis is a particularly important lens for studying the cognitive development of deaf children. The fine-grained analysis of adult-child interactions, with particular attention paid to the function of language and the role of dialogue, can contribute a lot to our understanding of higher psychological processes.

## The social origins of mind:

According to Vygotsky one must look beyond the individual to the society in order to comprehend the development of higher psychological processes within the individual. This is based on the assumption that higher psychological processes only appear in the interaction among individuals. Thus, Vygotsky distinguished between two different levels of social analysis, one the cultural-historical level discussed above, the other the more localised, face-to-face interactions that take place between members of a particular society. The latter form is expressed well in Vygotsky's general genetic law of cultural development (see 1.2.2.). An important and increasingly studied construct that follows from this general law of cultural development is the Zone of Proximal Development (ZPD see 1.2.3.). An understanding of the ZPD-concept is especially important in conceptualising issues relating to the instruction and assessment of deaf children. Vygotsky stated that all good instruction must be given in a child's zone of proximal development. The zone depicts a dynamically organised and changing section of instructability, mutually established by the individual as the one who knows and the domain as known. For the aim of assessing deaf children, oversimplified, able/disable dichotomies are not practical. A child who does not perform successfully when presented with items on a conventional standardised, unassisted test format might be in the process of transformation and might perform successfully with assistance.

## Semiotic mediation:

According to Vygotsky it is essential to differentiate between language as a system of abstract signs and the ways that such signs were actually used for communication between individuals. We must look to language in action, that is, the actual discourse that takes place between interlocutors, if we are to grasp the nature of thinking within the individual.

@ *Dialogue:*

In order to study the nature of thinking in deaf children, it is necessary to analyse their dialogic use of language in interactions with others, both hearing and deaf. Often deaf children have much less dialogic interaction with other deaf children than with hearing children. Adults may not have adequate communication skills to sustain lengthy and complex interactions with deaf children, and these children may not have a sufficiently developed language system. These communication factors may help to explain research showing that hearing parents of deaf children use more direct imperatives and negative verbal responses, and ask fewer questions, than do parents of hearing children (Schlesinger, 1988). The resulting problems illustrate the need for increased social interactions, consisting of rich, sustained dialogue with many opportunities to practice language skills. Meaningful dialogic activity leads to the establishment of intersubjectivity and finally to the internalisation of thought and language processes by the (deaf) child.

@ *Intersubjectivity:*

Intersubjectivity can be described as an interactive process by means of which "two individuals are able to agree on the definition of a given task and are aware that they do so" (Rommetveit, 1985; Wertsch, 1984). Participation in interaction leading to intersubjectivity demands that the listener (or signee) attends to the speaker's (or signer's) communicative act and engages in dialogue with the speaker. This point assumes both a recognition on the part of the listener that what a speaker says may make sense, and an ability to use all available linguistic and extra-linguistic (i.e., contextual) cues to deduce the meaning. The

directive role of the adult in establishing intersubjectivity is critical. A lack of intersubjectivity indicates a failure to create a temporarily shared social reality through semiotic mediation. Unless deaf children have adequate access to a rich communicative environment, they will have even more difficulties than hearing children in entering in intersubjectivity. The processes that permit intersubjectivity to be established are interactive. Consequently, an additional breakdown in the process of establishing and maintaining intersubjectivity may be the outcome of adults' inadequate communication skills. The degree to which a child becomes self-regulated greatly depends on the adult's competence to communicate and establish intersubjectivity. If there is poor communication between adult and child, this self-regulation may be limited to very concrete, contextual tasks that can be offered visually.

## 3.4. Past Perspectives on Deafness

In this and the next paragraph six more or less societal topics will be discussed in relation with deafness. It will become clear how progress in research has changed perspectives on deafness over time.

### @  *Deafness and language*

During the first half of this century, research has presented a disparaging view of deaf people, their language, their cognitive abilities and their educational expectations. Society in general, traditionally considered the deaf to function on a subhuman level, unable to be educated, deprived of human intelligence. It has always been unimaginable to our ancestors, one to two thousand years ago, that man could mature without the aid of language.

The failure to separate language from reason spawned a number of assumptions that shaped views of the human condition, and views of deafness. Religious, legal, and social perspectives of humanity have been shaped by the juxtaposition of language and the intellect. Christianity adopted the dualistic separation of the mind from the body, and postulated that the exercise of faith was the ultimate act of the intellect. This meant that salvation was possible only for those who could reason, which was demonstrated exclusively by their ability to speak. Legally, the possession of property was usually restricted to those with sufficient intellect to understand how to dispose of and use the property. The "test of intellect" most often employed was the ability of the owner to speak. Socially, those who did not acquire language not only were shut off from normal channels of social communication, but were also an embarrassment to families, who often concluded this misfortune was a punishment for past sins. These perspectives are best expressed in the slogan "deaf and dumb," which is derived from the Latin phrase indicating the inability to hear and the inability to reason, or speak. It is not surprising that early laws and social customs made no distinction between deaf people and mentally retarded people. Unfortunately such confusion has continued well into the twentieth century.

During the French Revolution the first free school for the deaf was established by the priest De l'Épée (1712-1789). When he noticed that deaf children signed among themselves, he drew up an inventory of these signs to use them for educational purposes. Followers of De l'Épée went to the United States to lay the foundation of the Education of the deaf. Their work has finally led to the development of the American Sign Language (ASL). In the same period De l'Épée developed his method, Samuel Heinicke, in Germany, founded the first public school to teach deaf children.. His methods stressed speech, or the oral method of instruction. The German method became popular in the Netherlands and in England. Via England it emanated to the United States, where in addition to the manual method, the oral method came into existence.

Gradually, this led to a controversy which up till now still dominates the education of deaf children. There are two names connected to this controversy. One of them is Edward Gallaudet, whose mother was deaf and communicated manually. He established the

American School of the Deaf, better known as: Gallaudet College. Several of his ideas still underlie a manual approach for the education of deaf children:

*   Sign language is the first language of the deaf;
*   Learning deaf children to speak is a burden to them and speech only has a function in the communication with the hearing;
*   Manual communication leads towards emancipation of the deaf;
*   Deaf teachers should be employed in the education of the deaf;
*   Compared to oral language, sign language is more apt at communication in large groups;
*   Deaf children have to make contacts with the community of deaf adults in order to be able to identify with them.

The other person is Alexander Graham Bell. Just like Gallaudet he had a deaf mother, but she had learned to speak. Bell devoted himself to propagating the oral method and opposed the manual method. His starting points were:

*   Sign language is a primitive language and makes its user primitive;
*   Oral communication leads to integration, sign language leads towards segregation;
*   Deaf adults are not qualified to teach deaf children.

Furthermore, it is said that Alexander Graham Bell campaigned to prevent deaf people from marrying, supported sterilisation laws designed to prevent them from procreating and claimed that deaf people shouldn't be educated together or even allowed to socialise among their peers.

It is apparent from this that the controversy between the oral and manual methods is not founded on scientific grounds, but on principles of life and pedagogical values. It has coloured all educational issues. All major decisions or changes concerning educational modes and manners have implied some position on the controversy. It is not only a difference in teaching methods; it affects the very essence of deaf people's existence.

## ۞ *Deafness and education*

The goals of education have been to teach deaf children to speak and to help them develop a language system that will enable them to function effectively in society. Davila restated this point: 'Throughout the centuries, the men and women who have pioneered developments in the field of education of the deaf have been obsessed with singleness of purpose: teaching deaf children to process spoken and written language accurately, thereby permitting them to master learning and to interact successfully with the world around them. These basic objectives have guided, and more or less eluded educators of the deaf over the years' (Scouten, 1984).

## ۞ *Deafness and cognition*

Within the period in which children were trained with the oral method, much research within the domain of intelligence was conducted. Deafness was considered as a natural experimental condition for studying developmental theory and philosophy (especially the connection between language and thinking).

Most studies found that deaf children showed deficiencies in performance. Deficits have been reported on tests of classification, concept formation, problem solving, sequential memory, Piagetian concepts and reading. This led to the belief that, lacking intelligible language, deaf people had intellectual abilities that fell far below those of hearing people. Myklebust (1960) suggested that the cognitive life of deaf and hearing people differ in some important aspects. According to Myklebust, deaf children find themselves in a more isolated world than their hearing peers:

A sensory deprivation limits the world of experience. It deprives the organism of some of the material resources from which the mind develops. Because total experience is reduced, there is an imposition on the balance and equilibrium of all psychological processes. When one type of sensation is lacking, it alters the integration and function of all the others. Experience is now constituted differently; the world of perception, conception, imagination, and thought has an altered foundation, a new configuration. Such alteration occurs naturally and unknowingly, because unless the individual is organised and attuned differently, survival itself may be in jeopardy. (Myklebust, 1960)

Fundamental experiences of deaf children are modified as a direct effect of hearing-impairment. This leads in turn to an alteration of all subsequently developed behaviours, making the deaf person inherently different from the hearing person in many ways. The inferior performances of deaf subjects has thus traditionally been rationalised as the result of language deficits, that is: speech. This explanation is compatible with past psychological theories (of cognition) that have claimed that thought is directly dependent on language (speech).

## Ⓔ Deafness and personality

Research in personality was conducted in order to reveal general characteristics of deaf people, the so-called: 'deaf personality'. However, personality is a concept that is very difficult to define. It covers more than intelligence does, and it is less open to scientific observation. Not surprisingly therefore, our stereotypes function primarily to what we assume to be the personality of the person. Disabled persons have always been subject to much stereotypic thinking. The deep-rooted tendency to conceive of the 'us' as good and normal and the 'different one' as inferior and abnormal is not easily replaced by a more rational attitude. Unfortunately science as well can be as much hindrance as help in this quest for rationality.

The following table is taken from an article from Lane (1988) who has drawn up an inventory of characteristics attributed to deaf people. This has resulted in a very negative profile of this population.

| SOCIAL | COGNITIVE | BEHAVIORAL | EMOTIONAL |
|---|---|---|---|
| Admiration, depends on | Conceptual thinking: poor | Aggressive | Anxiety, lacks |
| Asocial | Concrete | Androgynous | Depressive |
| Clannish | Doubting | Conscientious | Emotionally disturbed |
| Competitive | Egocentric | Hedonistic | Emotionally immature |
| Credulous | Failure externalised Immature | Empathy, lacks | |
| Disobedient | Failure internalised | Impulsive Explosive | |
| Conscience weak | Insight poor | Initiative lacking | Frustrated easily |
| Dependent | Introspection none | Interest few | Irritable |
| Immature | Language none | Motor development slow Moody | |
| Irresponsible | Language poor | Personality undeveloped | Neurotic |
| Isolated | Mechanically | Possessive | Paranoid |
| Morally undeveloped | Naive | Rigid | Passionate |
| Role-rigid | Reasoning restricted | Shuffling gait | Psychotic reactions |
| Shy | Self-awareness poor | Stubborn | Serious |
| Submissive | Shrewd | Suspicious | Temperamental |
| Suggestible | Thinking unclear | Unconfident | Unfeeling |
| Unsocialised | Unaware | | |
| | Unintelligent | | |

Table 3.1.     *Some Traits Attributed to Deaf People in the Professional Literature*

### ⊚ Deafness and research

Besides research on the 'deaf personality' and intellectual capacities of deaf children, which derived directly from the research on the interdependence of language and thinking, scientific studies of causes of deafness and the influence of such factors as heredity, birth injuries, disease and illnesses during pregnancy were undertaken. Deafness was seen as a disability which needs to be treated. Along with this thinking of deafness as a disability came another viewpoint of deafness, that of 'Deaf culture' which I discuss in the next paragraph along with some other new perspectives on deafness concerning language, education, cognition, culture, personality and research.

## 3.5. Present Perspectives on Deafness

### ⊚ Deafness and language

In the 1960s and 1970s psycholinguistics claimed that language and speech should be separated and that it is a misconception to infer complexity of language functioning from speech alone. Research in sign language received a strong initial push for investigating signing as a complete and valuable modality when linguistics and psychology distinguished between language itself and the modalities it is expressed in.

By the end of the 1970s this research had already demonstrated that sign languages are complete and full-fledged languages using the features of the visual-gestural modality. These developments have the capability to change positions and points of view in deaf education drastically.

### ⊚ Deafness and education

Deaf children usually have no deficits in linguistic and cognitive potentials, but have a severe problem of linguistic deprivation caused by access difficulties. Therefore, educational methods should be centred more on lifting the access barriers and on accentuating the process of natural self-directed language. Education should also acknowledge and stimulate linguistic experience within the accessible modality in order to acquire a sign language. Furthermore, deaf education should explore the ways this unique linguistic experience of deaf children can contribute to the acquisition of other linguistic skills (in spoken and written languages) and the learning of cognitive skills. The first language can be utilised as an intra-language to facilitate the acquisition of a second language. These educational approaches may represent the future of deaf education. However, such approaches are fully implemented in deaf education only in a small minority of schools and homes today.

### ⊚ Deafness and cognition

An important conclusion from many researchers (Bellugi, 1991; Martin, 1991) is that deaf children's cognitive competencies for learning, remembering, thinking, and language are not distributed differently than corresponding capacities in hearing children. Relative deficits for many deaf children in achieved levels of language, thinking, or education can most likely be attributed to limitations in the availability for deaf children of learning opportunities that allow fully for their hearing loss. However, there are marked differences in the processing strategies employed by deaf and hearing children. Deaf children and hearing children might differ either in the attentional strategies devoted to cognitive processing or in the functional characteristics of their short-term memories.

## ❦ Deafness and culture

According to Lane, deafness has its own language and culture. The relative frequency of deafness over generations has led to a fairly sound history of deaf culture arranged around many institutions such as the school, the club, and the church. Deaf people themselves have even founded schools, local clubs, national organisations, and religious groups. In the end this has resulted in what's been called: 'Deaf culture'. The cultural definition of deafness subscribes to an ideal of equality: all languages and cultures are equal because they are adaptations to the demands of life. Members of 'Deaf culture' view themselves as a minority population and anthropologists, psycholinguists and others have demonstrated that this culture has its own history, social structure and values as well as its own unique language. Indeed, minority empowerment movements across America and American society's increased awareness of its own diversity have brought a supportive context to the efforts of deaf people to have American Sign Language (ASL) recognised in planning educational policies and curricula. According to members of Deaf culture, oralists view deaf children as inferior, being damaged in their human nature. They only want deaf children to adjust to what society in general values as normal and desirable. However, manual communication systems employed by deaf individuals have existed and grown for centuries in the face of prejudice, hostility, and attempts of repression by the dominant hearing community. Now, more and more society is willing to see that the acceptance of the deaf community, not as a world apart from the hearing world but as a different world within the hearing world is very important for a healthy development of deaf children. 'If society really wants to help deaf people, upgrade their economic opportunities and to improve their quality of life, they should do this in consultation with and cooperation with responsible deaf adults and their associations, rather than pretending that 'we know what's best for them'. To propose to deaf people that ideally their lives should be similar to that of hearing persons so that no deaf community (or 'Deaf culture') would be needed is a form of denial which undermines the necessary basis of mutual respect and understanding' (Furth, 1973).

## ❦ Deafness and personality

In general, deafness is no longer conceived as a global and direct source of behaviour and personality traits; deaf as well as hearing children differ in their biological endowment, models, circumstances, and learning opportunities. Deafness now is more often considered as a high risk condition for increased chances that parents and educators won't succeed sufficiently to establish communication skills or a solid understanding of the rules of living of the community.

## ❦ Deafness and research

Recent research is becoming more and more aware of the fact that the context in which (deaf) individuals are living has a major impact on the course of their development (see, e.g., Power, Wood, & MacDougall, 1990).
As is outlined in chapter 2 of this paper, researchers have started to utilise a contextual/interactionist approach. This model of development emphasises dynamic interactions between the individual and his context. It incorporates the idea of constant change in interactions that is embedded within different levels of the individual's setting. Therefore, one cannot predict development. Development is not predetermined but probabilistic. Development is intertwined with changes at all levels and must be understood accordingly. The physical, emotional, and behavioural properties of the individual interact with the requirements of the context. This includes other persons within their setting as well as the physical characteristics of the environment. Development is seen as a self-activated process, wherein individuals play a role in shaping their own development.

The total situation in which the child finds himself, including institutional settings needs to be considered now. For example, researchers are becoming increasingly aware that children's

success in tests of logical reasoning depends in a large extent on their awareness of and familiarity with a set of cultural practices for interpreting a task and communicating the answer than on any ability to handle abstraction. The extent to which children become able to incorporate contextual information in a task which is consistent with this set of cultural conventions is a measure of the effectiveness of the teaching and learning they have experienced thus far. 'A great deal of the early research, by forcing the child to rely on verbal communication, took the risk of confusing cognitive failures with the child's inability to understand what they were required to do. Clearly, if attempts to test deaf children's understanding expose them to language demands that they cannot meet, then any 'failure' on their part may not be evidence of cognitive problems, but simply the result of a failure to establish mutual understanding between the deaf child and the (typically) hearing experimenter' (Bonkowski et al, 1991).

As was correctly stated by Wood, (1991) it seems to be quite possible that deaf children encounter developmental and educational delays not because they lack a language of thought but *because hearing people find it more difficult to pass on their knowledge, skills, and understanding to them because of problems of communication.*

# Part II:    Empirical Illustrations

*"Pour se comprendre lui-même, l'homme a besoin d'être compris par un autre. Pour être compris par un autre, il lui faut comprendre cet autre".*

Thomas Hora, *Tao, Zen and Existential Psychotherapy*

# Chapter 4: Description of the Study

## 4.1. Introduction

In this chapter, the study titled: "Socio Cognitive Interactions between Deaf Children" which is conducted in 1993 by J.F. Perret, A.C. Prélaz and A.N. Perret-Clermont, will be described first. A clear view of this study is needed for a better understanding of the subsequent analyses which I have carried out on this research.

In paragraph 4.2. a description of the subjects, the task, the experimental procedure and the results of this '1993-research' are outlined. The paragraph concludes with a recommendation for further research. It was possible to use the data of the original work to follow this recommendation. In paragraph 4.3. these so-called 'secondary analyses' are described. The formulation of the problem will be discussed and the chapter concludes with the hypotheses and the method of these secondary analyses.

## 4.2. The Initial Research: Socio-Cognitive Interactions Between Deaf Children

### 4.2.1. Introduction

This research which was conducted in 1993 was centred on the analyses of socio-cognitive interactions between deaf children in a spatial perspective-taking task. It is a replication of a research conducted in Australia (Peterson & Peterson, 1990). Its purpose was to study the intellectual competence of deaf children within a psycho-social perspective. Grounded upon research which studies the construction of intersubjectivity in a test or a didactic situation (Grossen, 1988; Schubauer-Leoni & al,1989, 1992; Perret-Clermont & al, 1991) the point of departure was the following general hypothesis: beyond language problems, it is the construction and negotiation of a shared task meaning which is especially difficult between an adult and a deaf child. The interaction between children would have the effect of efficiently directing the child towards a shared definition of the situation and expectations of the adult.

### 4.2.2. The Subjects

A total of 26 children attending two special schools for deaf children in Switzerland took part in the experiment. The age of these children ranged from 5 to 17 years. Their level of sign language was in general sufficient to comprehend the signed verbalisations of the experimenter. The graphic below shows the age-distribution of the children (n=25).
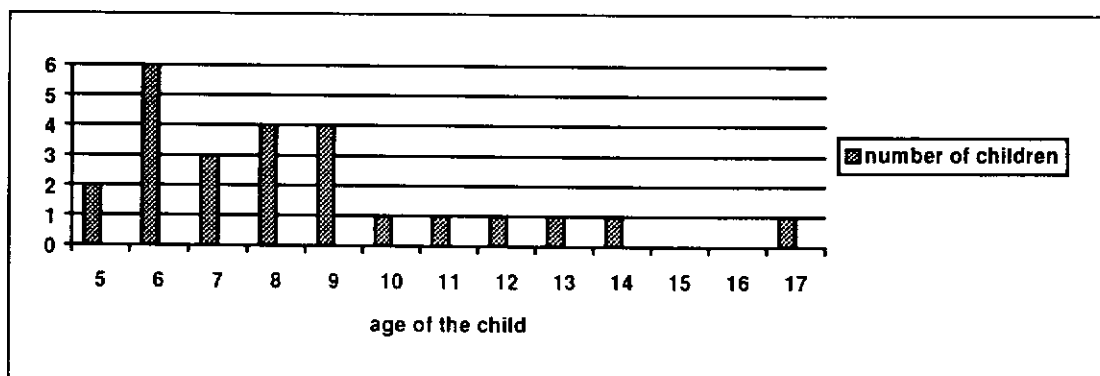


**Figure 4.1.: Age-distribution of the children**

In this research the degree of deafness was not a selection-criteria. Fortunately there are so few deaf children in the French speaking part of Switzerland that it was not possible to operate a selection. Thus as well children with a moderate hearing-loss as those with a profound hearing-loss were included in this study. The graph below shows a distribution of the degree of deafness of the children who participated in the research.
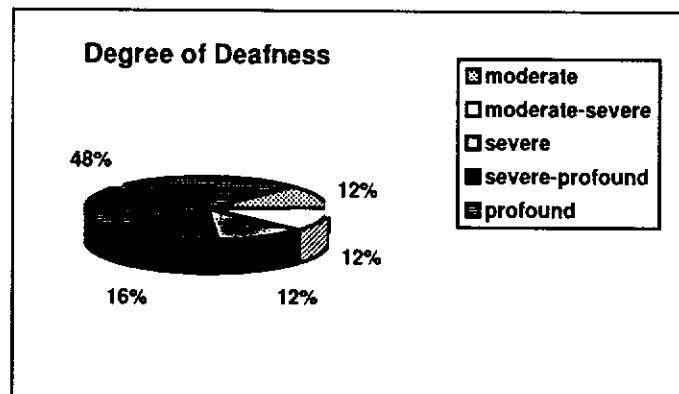


**Degree of Deafness**

48%
12%
12%
16%    12%

☒moderate
☐moderate-severe
☐severe
■severe-profound
☒profound

**Figure 4.2: Distribution of degree of deafness**

### 4.2.3. The Task

The "village" test, an adapted Piagetian task (Doise, Mugny and Perret-Clermont, 1975, and Doise & Mugny, 1981), was used in order to bring about an effective confrontation of points of view between two children who were seated on different sides of a model village set out on a table. A model-village of several houses arranged on a cardboard plate by the experimenter had to be reproduced by the subjects on an identical base but with a different orientation. A small part near the base of the cardboard is painted in blue to resemble a lake.

Two pairs of three lego houses have been used in the experiment. Each pair was made up of three houses which where different in colour (red, blue and yellow) and form (rectangular, square). The doors and the windows of the houses were all different so that each house has a clear entrance and four different sides. The following instruction was given in signed French (French accompanied with signs):

> "Tu vois là (pointer), c'est mon village, là (pointer) c'est mon lac. J'aimerais maintenant que toi tu construises exactement le même village là (pointer), sur ta table. Ça (pointer) c'est ton lac. Mais attention! on va imaginer qu'il y a deux filles: une fille près de mon lac et une fille près de ton lac. Il faut que les deux filles voient les maisons exactement à la même place"

A transparent was attached on the cardboard plate to note the position of the houses which the child has placed on the plate. Besides this a video camera was used to permit detailed analyses of the interactions.

### 4.2.4. The Experimental Procedure

The procedure followed consisted of three phases:

1. An individual pre-test to determine the child's perfomance level (conserving, intermediate, non-conserving). This pre-test was made up of three items outlined below.
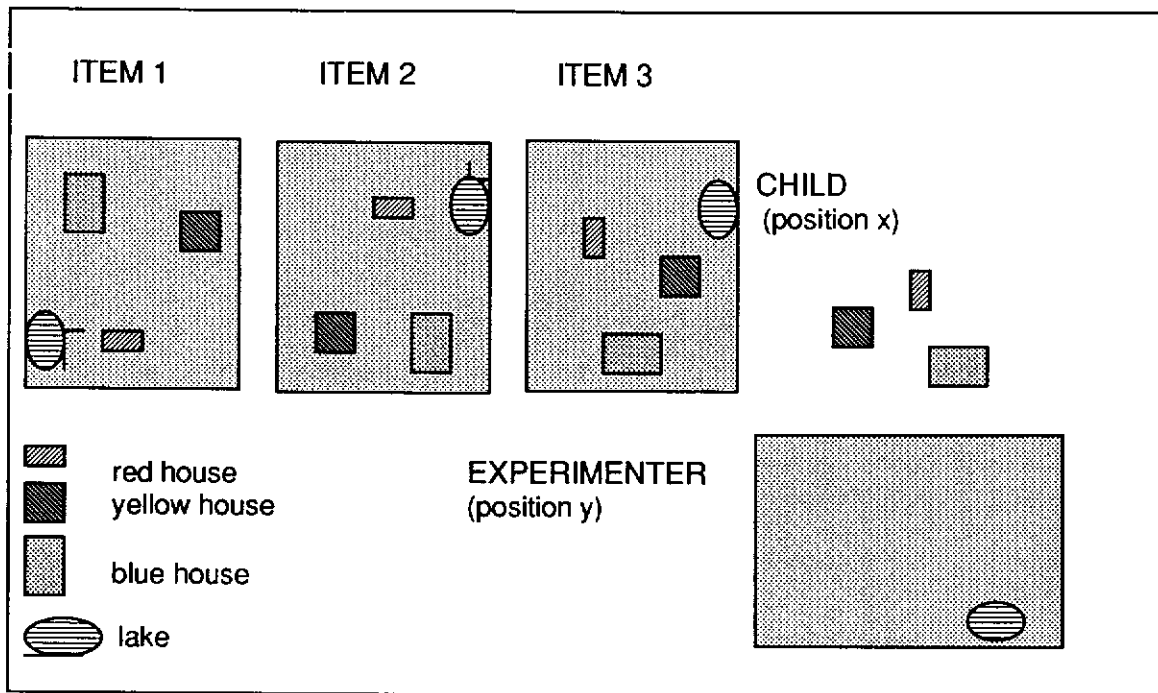
**Figure 4.3.:** Items pre-test

---

2. An interaction phase. In dyads the children are requested to place the houses in four successive positions. The children are asked to work together and to agree upon a joint solution.

3. A post-test during which the children are again individually questioned with the same items as during the pre-test.

Each phase of the experiment took place at intervals of 2-3 days.

### 4.2.5. The Results

The replication of the "1990 Peterson and Peterson experiment" has enabled the researchers to confirm that not only deaf children are very well capable of interacting among themselves but that they manage to profit from these interactions and make improvement in the elaboration of their responses.

These data are taken as a request to change the approach. Instead of looking into children's past records in search of explanations for their weak achievements, it is the *present* situation in which the children are demanded to act or interact and in which their competencies are assessed which requires particular attention. The first results obtained show a relationship between the initial building up of a shared meaning for the task between the adult and the child, and the performances in the pre and post-tests. Further study is necessary to determine the communication and cognitive processes through which a shared understanding of a given task is negotiated.

In 1997, research is carried out to proceed these aspects. This research will be called "secondary analyses" because it was possible to use the original research-data. The next paragraph describes the design of these "secondary analyses".

## 4.3. The Secondary Analyses:
## The Establishment of Intersubjectivity in a Test-Situation

### 4.3.1. Introduction

Following the directions for further research, the secondary analyses carried out on the 1993-research "socio-cognitive interactions between deaf children" are aimed at looking more closely at the processes at work in the construction of a shared meaning of the task in a test-situation. A test-situation can be defined as a tripolar interaction involving an experimenter, a child and a task. As the result of a given social practice which is culturally situated, the task is the expression of a given perspective: that of the researchers who constructed it according to some scientific and cultural assumptions in order to pursue their own aims. Previous research (Grossen, 1988) based on the analysis of adult-child interactions in psychological tests, has shown that children's answers do not necessarily focus on the same object as the experimenter's questions. Sometimes children's answers are based on different interpretative assumptions, creating a misunderstanding which the experimenter can try to clear only by abandoning the neutrality required by her role. So, the experimenter is led to give verbal and non-verbal clues concerning the expected answers or behaviour and to negotiate the meaning of the task and situation. Thus the experimenter acts as a social mediator between the child and the task. The research of Grossen has also shown that children try to interpret the situation and make sense of it with respect to other familiar situations. To solve the problem, the child has to interpret the whole situation on the basis of social and relational clues provided by the context itself. In order to do this, children refer to their knowledge of other contexts. They do it more easily if the immediate conversational object can be linked to knowledge previously acquired in other contexts. Important questions from a psycho-social point of view are: What definition does the child give to the situation and the task? In the child's opinion, what type of activity is required in the situation? How does the child interpret the experimenter's instructions? What part does the experimenter play and how does the child perceive this part? How is the system of mutual expectations regulated in this dyad?

### 4.3.2. Formulation of the Problem

The secondary analyses on this research are aimed at determining how an intersubjectivity gets constructed between the partners in a test-situation. Which processes in this joint construction can be identified. It was found that the interlocutors do not always have the same starting point. Misunderstandings are found to occur as a consequence (Rommetveit, 1979). These are taken by the partner as a sign of negative evidence of understanding which he has to resolve in the course of the interaction to reach a sufficient level of intersubjectivity. This is necessary for a successful performance of the task. The formulation of the problem can thus be stated:

> Which problems do occur in the construction of intersubjectivity between a deaf child and a hearing experimenter during the instruction phase of a task in their first encounter?

Research has indicated that children try to interpret the situation and make sense of it with respect to other particular situations. Therefore it is interesting to describe the way intersubjectivity is established during the post-test as well. According to Grossen (1988), in the post-test there should be less problems to reach a sufficient level of intersubjectivity for cognitive progress to happen. Thus another problem becomes:

> How does an intersubjectivity gets constructed between a deaf child and a hearing experimenter during the instruction phase of a task in their third encounter (that is: in the post-test)?

### 4.3.3. Definitions

Intersubjectivity:      An interactive process by means of which "two individuals are able to agree on the definition of a given task and are aware that they do so" (Rommetveit, 1985; Wertsch, 1984).

Partners,
Interlocutors:      Dyads consisting of the adult (or experimenter) and the deaf child.

Test-situation:      A situation in which individual cognitive abilities are assessed through administration of standardised tests. In this research the "village" test, a piagetian task, adapted by Doise, Mugny and Perret-Clermont (1975), and Doise & Mugny (1981) has been used for assessment.

Misunderstandings:      Any indication of negative evidence of understanding in the course of the interaction. Misunderstandings occur when the intended meaning (what the speaker intends) does not match the perceived meaning (what the listener understands).

Negative evidence:      Evidence in the course of the interaction that one has been misheard or misunderstood (H.H. Clark & S.E. Brennan, 1991)

### 4.3.4. Hypotheses

Reflecting on the theory (Schubauer-Leoni, M.L., Perret-Clermont, A.N., & Grossen, M. 1992) I expect that in both pre-test and post-test the child and the experimenter are likely to proceed with more or less successful adjustment, to enter in the expectations of their partner and to reach some degree of intersubjectivity about the task and the situation. But in the test-situation, especially during the pre-test, the child cannot refer to some scripts, only the adult is trained to the script of an experimental situation and the child has to find his way without specific training for this peculiar relationship.
Comparing pre and post-test:

The pre-test (where the child is confronted by an unknown adult in an unfamiliar context) results in a form of question/response sequences in which both partners are obliged to construct a shared world of meanings in the here and now of the interaction. As a result there will be more communication breaks or misunderstandings.

The post-test (where the child can refer to his previous experience acquired in the pre-test and in the interaction phase) results in less problems to construct a shared world of meanings, because, here both the child and the experimenter can refer to knowledge built up in the pre-test. As a result there will be less communication breaks or misunderstandings.

The hypothesis is stated as follows:

During the pre-test there are more communication breaks or misunderstandings than in the post-test. Hence the establishment of intersubjectivity requires more "repair" transactions compared with the post-test. During the pre-test the experimenter and the child are seen in more different behaviours to establish a mutual understanding of the task than in the post-test.
In sum: Cognitive and social behaviours will be different in pre- and post-test as a result of the ideas that:

1. the child gets more acquainted with the task and the situation
2. the child becomes familiar with the experimenter's demands
3. the child benefits from social interaction
4. the child and the adult can refer to previous knowledge

### 4.3.5. Method

To investigate the social and cognitive behaviours at work in the establishment of intersubjectivity between a deaf child and an experimenter in a test-situation, 8 video-recorded interactions have been transcribed. These interactions concern their verbal and non-verbal behaviours during the instruction and construction of the first village. This is transcribed and analysed in both the pre and post-test of 4 children. To interpret the interaction, I have divided it in sequences as well. In each sequence, a description is given of what actually happens in the interaction. Then, the behaviours in the sequence are explained and interpreted in terms of intentions and intersubjectivity, indicated with the symbol: Ψ

The following symbols are used in the transcription. A supplementary sheet of symbols is added in this paper to facilitate reading the transcribed interactions in chapter 5.
*(See on next page).*

# KEY TO SYMBOLS

## SYMBOLS OF TRANSCRIPTION OF INTERACTION

A = Adult                                              C = Child

| | | | | |
|---|---|---|---|---|
| (+) | Confirmation question | | [+] | Acknowledgements, affirmatives |
| (...) | Incomprehensible utterance | | [...] | Incomprehensible utterance |
| (abc) | Non-verbal actions | | [abc] | Non-verbal actions |
| (s) | Manual sign | | [s] | Manual sign |

: 

A.1: = conversational or behavioural turns of the adult

C.1: = conversational or behavioural turns of the child

$_{1,2,...20}$ = counts of verbal and non-verbal utterances or actions (in superscript)

> = continuation of turn

c: = actions from the child which do not present a need for the adult to intervene (i.e. to re-establish communication or to abandon her neutrality)

- ↔ - = simultaneity of behaviours and/or utterances

/ = short pause

// = longer pause

{abc} = comments

| | | | | |
|---|---|---|---|---|
| h1a | red house (adult) | h1c | red house (child) |
| h2a | yellow house (adult) | h2c | yellow house (child) |
| h3a | blue house (adult) | h3c | red house (child) |
| v1 | village or groundplan (adult) | v2 | village or groundplan (child) |
| lake1 | lake (adult) | lake2 | lake (child) |

## SYMBOLS OF ENUMERATION OF SEQUENCES

→ next action/utterance

*italics* ↔ *italics*   occurences of simultaneity

Ψ   psychological explanation of sequence

# Chapter 5. Enumeration and Analyses of the Interactions

In this chapter a total of 8 interactions between the hearing experimenter and the deaf child are transcribed and described.

For privacy reasons, the names of the children are fictitious.

@ Interaction 1 and 2 is with a 6-years-old boy, named Julien. His deafness is severe-profound.

@ Interaction 3 and 4 is with a 8-years-old girl, named Stefany. Her deafness is moderate.

@ Interaction 5 and 6 is with a 9-years-old girl, named Marjorie. Her deafness is severe-profound.

@ Interaction 7 and 8 is with a 17-years-old girl, named Sigrid. Her deafness is profound.

I want to stress here that between the pre and post-test all children went through an interaction-phase. Each post-test is thus the third encounter between the experimenter and the child.

INTERACTION 1:

ADULT - JULIEN (6 years; degree of deafness: severe-profound)
PRE-TEST: FIRST ITEM

## VERBAL AND NON-VERBAL TRANSCRIPTION OF INTERACTION

A.1:  mon village, tu as vue? Il y a trois maisons, la rouge ↔ (points h1a) [1]

C.1:  [looks away from A at h1c which he holds in his right hand] [2]

A.2:  (ticks at table) [3]

  c:  [eye gazes at A] [4]

>A:  la / la jaune ↔ (points h2a) et la bleu ↔ (points h3a)
    puis là ↔ (points lake 1) c'est quoi [5] /

C.2:  [signs: lac] [6]

A.3:  mon lac, oui [7]. Puis là ↔ (points v2) [8]

C.3:  [takes h2c] [9] //

>A:  Julien [10] (takes h2c and then takes h1c and h3c) [11] là (points v2) j'aimerais [12] ↔

  c:  [does not gaze at A, looks straight in front of him] [13]

>A:  Julien Julien [14] ↔ (bends forwards) [15]

  c:  [eye gazes at A] [16]

>A:  j'aimerais que toi tu construises exactement le même village là ↔ (points v2) [17]

  c:  [looks down at v2] [18]

A.4:  ça ↔ (points lake2)/ c'est ton lac [19]

  c:  [+] [20] /

>A:  mais attention on va imaginer là [21] ↔

  c:  [±] [22]

>A:  tout près du lac une fille [23]

  c:  [+] [24]

>A:  oui [25]

    là ↔ (points at spot near lake2) il y a aussi une fille / les deux filles elles voient les maisons exactement à la même place [26]

  c:  [+] [27]

C.4:  [looks to his village] [28] ↔

A.5:  (knocks at table) [29]

  c:  [eye gazes at A] [30]

>A:  possible que toi tu construises exactement le même village (gives the houses) le même
    ↔ [31] (points alternately to v1 and v2)

  c:  [+] [32]

C.5:  [takes h3c] [33] [points to v2] [34]

A.6:  oui le même [35]

C.6:  [places h3c at v2] [36] [takes h2c and h1c and places them at v2] [37]
    {proceeds without looking to the model village and places them wrongly}

A.7:  (bends down in the child's field of vision) [38]

C.7:  [takes away h2c to open its doors and windows] [39] [takes h1c and h3c to open its doors and
    windows] [40] ↔

A.8:  (looks in the camera) [41] (takes the marking pencils and lies them on the floor) [42]
    (taps on the table) [43]

  c:  [looks up, eye gazes A] [44]

>A:  le même? (points at v1 and v2) (mimics a very astonished expression) [45]

C. 8:  [points at h1a and concentrates again on h2c and h3c] [points at h2a and h2c] [46]

A. 9:    (s) [47]

C. 9:    [points at h3a and h3c] [48] [eye gazes at A] [49]

A.10:    juste même +(s) [50] (points at the model's houses, points at v1, points at v2)

C.10:    [displaces the houses on v2] ↔ [looks repeatedly at v1] [51] [eye gazes at A] [52]
         {displaces the houses not correct}

A.11:    même chose?+(s) [53]

C.11:    [points to h1a] [54] [looks at h1c] [55]

A.12:    oui / exactement le même chose [56]

C.12:    [looks at h1c] [57] ↔

A.13:    (starts to explain something) [58]

C.13:    [bends down to take the other houses] [59] ↔

A.14:    (touches C) [60]

     c:    [eye gazes at A] [61]

>A:    là [62]

     c:    [signs: lac] [63]

>A:    la fille (points at spot near lake1) [64]

     c:    [looks at spot near lake1] [65]

>A:    là la fille ↔ (points at spot near lake2 where the girl is supposed to be) [66]

     c:    [points at a spot near lake2] [67]

>A:    la fille, les deux elles voient le même chose [68]

C.14:    [looks at the table and touches the place on the table where the marking pencils had been
         before] [69]

A.15:    ils sont là (shows C the pencils) [70] (points at spot near lake2) ↔ là, la fille, elle voie    le
         même chose que là ↔ (points at spot near lake1) la fille voit? [71]

C 15:    [+] [72]

A.16:    c'est le même chose? ↔ (looks very surprised) [73]

C.16:    [points to h1a and h1c] [74] [opens the door of h1c] [75] [eye gazes at A] [76]

A.17:    Bizarre (s) [77]

C.17:    [removes the other houses ] [78] [eye gazes at A] [79]

A.18:    même? +(s) [80]

C.18:    [looks at v1] [81] [looks at v2] [82] [eye gazes at A] [83]

A.19:    même? + (points and looks at v2 and v1, then gazes at the child) [84]

C.19:    [+] [85]


## ENUMERATION OF SEQUENCES

First, a description is given of what actually happens in the interaction. The numbers of acts
in superscript refer to correspondent numbers of acts in the transcription.
Second, the sequence is explained, indicated with the symbol: Ψ

→        =                    next action/utterance or: leads to
italics ↔ italics:          occurrences of simultaneity
NB:      The strategies are underlined

sequence: (1 - 4)

1. The adult starts explaining the task [=1] → The child looks away from the adult to his red
   house [=2] → The adult knocks at table [=3] → The child gazes the adult [=4]

Ψ        The adult starts to explain the task and the child is paying attention to the adult. On
the moment that the adult points to her red house, the child looks away from the adult and
gazes at his red house, which he holds in his hand. It seems as if the child wants to
communicate: "There is a red house here as well". The adult, who wants to continue with

46

the instruction notices that there is no eye gaze anymore between them so she has to re-establish this. By knocking at the table in front of the child, the adult tries to attract the attention of the child = <u>Non-verbal attention management strategy</u>. The adult succeeds in this because the child gazes at the adult again. The adult can now continue the instruction of the task.

sequence: (5 - 6 - 7)

1. The child pays attention to the adult, the adult continues the instruction and asks the child a task related question $^{=5}$ → The child answers the question in sign language $^{=6}$ → The adult communicates to the child that his answer is good $^{=7}$

Ψ       An important prerequisite for communicating with a deaf child is established: the attention of the child. The adult uses the attention of the child to continue her instruction. She asks a question in order to keep the child's attention and she probably hopes that the child gets the implicit message that he has to wait and listen to the adult = <u>Precaution strategy</u>. The adult might want to be perceived as a teacher. By asking question she engages in a teacher-role. The child correctly answers the question and the adult presents feedback. The sequence of: asking questions - giving answers - presenting feedback, is frequently observed in teacher - pupil exchanges (see chapter 6). In this case, however, asking question could be considered as a strategy to 'control' the attention of the child.

sequence: (8 - 13)

1. The adult continues to explain the task $^{=8}$ → The child takes yellow house $^{=9}$ → The adult calls the child $^{=10}$, takes away the houses $^{=11}$ and goes on with the instruction $^{=12}$ → The child does not gaze at the adult but seems to look at the wider context in which he's placed $_{=13}$

Ψ       The child pays attention to the adult thus the adult continues the instruction of the task. After the adult has pointed to the ground-plan of the child, the child takes his yellow house. It seems that the child has interpreted the adult's pointing behaviour as an invitation to play. So there is a mismatch of the adult's intended meaning and the child's perceived meaning. As there is no eye gaze anymore between the two interlocutors, the adult has to re-establish this in order to continue with the instruction. The adult calls the child's name = <u>Verbal attention management strategy</u> and takes away the houses which have distracted the child's attention from the adult = <u>Precaution strategy to control the attention of the child</u>. The adult now thinks she has the attention of the child and continues with the instruction, however the child does not pay attention to the adult at all. For the child, the little lego houses can have only one meaning: toys. And with toys you can play. Thus, the child who is seated in front of funny houses cannot think otherwise than that he is in a play-situation. But then, suddenly when he starts to play, the adult takes away the toys! The child seems to be engaged in figuring out the reasons of the, from his point of view, adult's 'strange behaviour' as he did not get an explanation of why she took away the houses. Besides this, the child may have been told, while being taken out of the classroom, that he is going to play a little game with a nice lady. This makes the action of the adult even more difficult for the child to understand.

sequence: (12 - 16)

1. The adult continues the instruction $^{=12}$ → The child does not gaze adult $^{=13}$ → The adult call's the child $^{=14}$ and bends a little bit forward $^{=15}$ → The child gazes the adult $^{=16}$

Ψ       As we have seen in the previous sequence, the adult continues with the instruction, but the child does not pay attention to the adult at all. The child seems to be engaged in figuring out the reasons of the, from his point of view, adult's 'strange behaviour' as he did not get an explanation. As the adult, while giving her instruction, becomes aware that the child gazes elsewhere, she tries to repair the contact by at the same time calling the child's

name = <u>Verbal attention management strategy</u> and bending forward = <u>Non-verbal attention management strategy</u>. The child reacts by looking up at the adult.

1. The child gazes the adult $^{=16}$ → The adult continues the instruction and points at v2 $^{=17}$ → The child looks at v2 $^{=18}$ → The adult continues the instruction $^{=19}$ → The child nods $^{=20}$ → The adult continues the instruction $^{=21}$ → The child nods $^{=22}$ → The adult continues the instruction $^{=23}$ → The child nods $^{=24}$ → The adult asks for confirmation of understanding: "yes" $^{=25}$ and continues the instruction $^{=26}$ → The child nods $^{=27}$

Ψ      In this sequence the function of giving positive evidence of understanding is very clear. It serves as a 'continuer", that is: it drags the conversation forward. And indeed, it does exactly this. The child is very attentive and he acknowledges frequently, which causes the adult to continue. If the child was only attentive and did not acknowledge, the adult probably would try to elicit confirmations of understanding more often. Eliciting of confirmations is however a normal communication process.

1. The adult goes on with the information $^{=26}$→ The child acknowledges $^{=27}$ → The child looks at his village $^{=28}$ → The adult knocks at the table $^{=29}$ → The child gazes the adult $^{=30}$

Ψ      The adult continues with the instruction. The child gives an acknowledgement, which is interpreted by the adult as a sign of understanding what has been said. The child engages passively in the task, by looking at his ground-plan. He apparently thinks that the adult is finished. As a matter of fact, the adult has given sufficient instructions to the child in order to construct the village. So, that the child engages in the task and looks at his empty ground-plan is not so strange at this moment. However, looking at the behaviour of the adult who knocks at the table in order to attract the attention of the child = <u>Non-verbal attention management strategy</u>, it was not her intention to let the child enter into the task at this moment. Even though the child behaves appropriately the adult gives him negative feedback by re-establishing contact. The child might get the impression that he doesn't behave in a desired way. The child reacts by looking up to the adult. We cannot really say that there is a misinterpretation in this sequence, for the action of the child fits in the context even though the adult's intentions were different. The adult acts in her role as an experimenter and is determined to sustain it. In sum, the disruption in the interaction is due to the adult's being tenacious of her role in the script.

1. The child pays attention to the adult $^{=30}$ → The adult has finished the instruction, asks the child to construct the village and points at v1 and v2 $^{=31}$ → The child nods: 'yes' $^{=32}$ → The child takes the blue house in his hands $^{=33}$ → The child points at v2 $^{=34}$ → The adult answers 'yes', the same $^{=35}$

Ψ      The child is attentive to the adult. The adult communicates that he now wants the child to construct the village. She points at both the model and the ground-plan to indicate that the villages have to be the same. The child gives positive evidence of understanding and he engages actively in the task. He points at his ground-plan as if he wants to know whether he has to construct the village there. The adult gives positive feedback and provides additional information that it has to be the same. In this sequence we see that the child gives positive evidence of understanding the request. He acts indeed as if he understands because he engages actively in the task, which is an appropriate activity. He then seems to ask a question by pointing which seems to be understood by the adult

1. The child places the houses without looking at the model $^{=36+37} \rightarrow$ The adult bends forward in the child's visual field $^{=38} \rightarrow$ the child takes the yellow house and opens doors and windows $^{=39+40}$

Ψ    The child places the houses without looking at the model. In interpreting this behaviour, there are two possibilities: the first one is that the child has not understood the instruction, the second, more plausible one is that the child did not receive the instruction due to his hearing problems. Anyhow, the adult has to depart from her neutrality and undertake some correcting and structuring behaviour in order to direct the child towards the expected behaviour. First of all, the attention of the child has to be attracted. The adult tries to do this in a visual way by bending forward = Non-verbal attention management strategy. The child, however, continues to play and opens the doors of the houses. There are two possible explanations for the fact that the child does not react in the expected way: the first one is that the child, being absorbed in his play, did not notice the movement of the adult at all, the second possibility is that the child thinks the adult is going to play with him and interprets her movement as a preparation for play.

sequence (40 - 44)

1. The child opens doors and windows of red and blue house $^{=40} \rightarrow$ The adult looks in camera $^{=41}$ puts the marking pencils on the floor $^{=42}$ and knocks on the table $^{=43} \rightarrow$ The child gazes at the adult $^{=44}$

Ψ    Anyhow, the child continues to play and does not react according to the adult's intentions. The adult decides not to intervene yet. She follows a wait-and-see strategy = Intentions-decoding strategy.
Apparently, she expects the child, himself to establish the contact soon, after which she can direct the child to her expectations. The child, so fully absorbed in his play, leads the adult to decide not to wait anymore but to attract the attention of the child herself. The adult now chooses to knock on the table instead of bending forward which had turned out to be not so effective = Non-verbal attention management strategy. The child cannot interpret this behaviour otherwise then an attempt from the adult to establish contact. Hence, the child looks up to the adult.

sequence (45 - 46)

1. The adult 'asks' if both villages are the same: "le même" and mimics an astonished expression $^{=45} \rightarrow$ The child points at both yellow houses $^{=46}$

Ψ    The adult's general aim is to put the child back on the task again. She wants to reach this goal by reminding the child that he has to construct the village according to the model in such a way that the two villages are exactly the same.
She utters: "le même"? (the same?) and she points to both villages.
First, the adult's utterance is very brief. This breaks the maxim of Quantity which says that the speaker should make his or her contribution as informative as is required. Second, the adult's utterance is not very explicit and can be interpreted in more than one way. This breaks the maxim of Manner which says that the speaker has to avoid obscurity and ambiguity. It is nearly impossible for the child to decode the adult's intentions and it would probably have been equally difficult for a hearing child.
The child tries to make the best out of the adult's ambiguous utterance and points to both yellow houses. In doing this, the child has interpreted the adult's utterance as a request to point out which houses are the same. This is quite understandable, even logic because it matches with the situation. Out of the child's reaction, the adult can infer that the intended meaning of her utterance does not match the perceived meaning of the child. This marks the beginning of a difficult interaction which is centred on the negotiation of the meaning of the task.

1. The adult signs something $^{=47}$ → The child points at both blue houses $^{=48}$

Ψ       The adult signs something. Unfortunately it is not clear what she signs but relying on the previous sequence, the adult probably does not understand the child's pointing behaviour. So, she might decide to sign that which she's uttered in the previous sequence: "le même"? This make sense, as the child reacts by pointing at both blue houses, trying to communicate that these houses are the same. Again, the adult is confronted with a mismatch between her intentions and the way it is interpreted by the child. At this moment, the child is not confronted with this problem, as he is not aware of the misunderstanding.

sequence (48 - 50)

1. The child points at both blue houses $^{=48}$ → The child eye gazes at the adult $^{=49}$ → The adult says: "juste même" $^{=50}$

Ψ       The child thus gives his interpretation of the adult's ambiguous utterance by pointing at both blue houses. He then looks up to the adult as he wants to have some feedback from her concerning his "answer" = Intention-decoding strategy because when the adult reinforces the child's behaviour he can conclude that he has behaved like the adult wants him to. The adult, who's intentions are not shared by the child, doesn't give feedback but benefits from the child's eye gaze to remind the child that he has to construct the village according to the model in such a way that the two villages are exactly the same. (juste même" + sign).

sequence (50 - 51)

1. The adult repeats: "le même?" $^{=50}$ → The child displaces the houses and looks repeatedly at the model $^{=51}$

Ψ       The adult who wants to point to the child that he has to construct the village exactly the same as the model and that he therefore has to look at the model seems now to succeed in this purpose, even though she did not reformulate this request. The child displaces the houses and pays attention to the model. This behaviour is exactly according to the adult's intentions. We can, however, not conclude that the child and the adult have the same definition of the task. The child may not consider the model as a prerequisite for constructing his own village but might have completely different reasons for looking at the model. For example the child may just change his working method as reaction of the repeated questions of the adult. If this is true, the child has incorporated the 'didactic contract' in the test-situation, in which repeated questioning on the part of the teacher is viewed by the pupils as negative feedback which is causes them to change their response (see chapter 6).

sequence (51 - 53)

1. The child displaces the houses and looks repeatedly at the model $^{=51}$ → The child eye gazes at the adult $^{=52}$ → The adult repeats: "le même?" $^{=53}$

Ψ       The child has changed his working method. He now looks repeatedly at the model. Of course this behaviour is exactly in line with the adult's assumptions, but the child does not know this and is engaged in a scanning process or intention-decoding process. The child finally gazes at the adult in search for feedback = Feedback eliciting strategy. The adult repeats "le même" which in this context has now suddenly another meaning. The adult wants to verify is the child has finished his construction. It would have been better if the adult has formulated this otherwise. We will see that the child logically has no experience with the psychological script and interprets the actions of the adult according to a didactic script.

1. The adult repeats: "le même?" → The child points at the adult's yellow house and looks at his own yellow house → The adult states that they are exactly the same

Ψ     As the child has now behaved accordingly to the adult's intentions, the adult wants to know if the child has finished. In other words, the adult wants to know if the child's construction of the village is the same as the model's. Thus she asks again: "le même?", meaning: are both villages the same now? are you finished? Her formulation is not very well chosen because the child may think now that his working method was not intended by the adult. Indeed, we see that the child returns to previous given answers on these questions: the child points at the adult's yellow house and looks at his own yellow house. Out of this behaviour the adult can conclude that her intentions are not likewise perceived by the child. Finally however, she understands the child. She gives positive evidence of understanding by giving an acknowledgement. She doesn't explain, however, that the child's definition of the task is not congruent with her intentions. Probably it would have been better if the adult had acknowledged the different points of view and had played the 'game' of the child. She could use the child's definition of the task as an opportunity to 'scaffold' or guide him towards her own intentions. This would also have given the child positive feedback.

sequence: (57 - 61)

1. The child looks at his red house $^{=57}$ but the adult starts to explain something $^{=58}$ ↔ but the child bends down to take the other houses $^{=59}$ → the adult touches the child $^{=60}$ → The child gazes at the adult $^{=61}$

Ψ     The adult wants to repair her ambiguous former utterances by explaining it more clearly but the child does not pay attention. The child is glad that he finally has been understood and he bends down to take the other houses. The adult, who wants to clear the misunderstanding, touches the child to get his attention = Non-verbal attention management strategy. The child reacts by gazing at the adult and might get the impression that he's not allowed to 'play' with the houses.

sequence: (62 - 69)

1. The adult indicates the spot at lake1 $^{=62}$ → The child signs [lac] $^{=63}$ → The adult indicates the girl near lake1 and points the spot $^{=64}$ → The child looks at the pointed spot $^{=65}$ → The adult indicates the girl near lake2 and points $^{=66}$ → The child points as well $^{=67}$ → The adult asks the child if the two girls see exactly the same $^{=68}$ → The child looks at the table and touches the place where the pencils had been before $^{=69}$

Ψ     The adult starts reformulating a part of the instruction and the child is attentive. He follows the adult's pointing by gazing at the pointed spot and then even by also pointing to the spot which is pointed by the adult. The adult wants to know if the child has placed the houses of his village exactly the same as the houses of the model. She does this by referring to the relative positions of the girls who are supposed to look at the houses exactly the same way: "la fille, les deux voient le même chose?" (The girls do the two of them see the same thing?). From the behaviour of the child we can conclude that he has difficulties grasping this abstract concept of the imagined girls. He shows off-task behaviour and probably searches for help.

sequence: (69 - 70)

1. The child looks at the table and touches the place where the pencils had been before $^{=69}$ → The adult shows the pencils" $^{=70}$

Ψ    The child searches for help and in expressing this he unintendly touches the place where the pencils had been before. The adult misinterprets the child's 'cry for help' and thinks that the child wants to know were the pencils are. The adult shows the pencils.

sequence (71 - 72)

1. The adult repeats the question: "là, la fille, elle voie le même chose que là, la fille?" [71] → The child nods "yes" [72]

Ψ    The adult probably thinks that the child did not understand the question so she reformulates it = Strategy to direct the child towards the adult's intentions. However, it is the total concept of the 'imagination of a person standing by the lake', that is difficult to grasp for the child. Indeed research has repeatedly found indications of difficulties in symbolic play in deaf children (see chapter 6). The child knows how to react on a question (because he has experience with the didactic contract) and answers "yes" probably to please the adult. We cannot conclude that the child has understood the question if he even received it, neither can we conclude that the child shares with the adult the same definition of the task.

sequence: (73 - 74)

1. The adult questions the child's judgement and looks very surprised [73] → The child points to both red houses [74]

Ψ    By questioning the child's judgement the adult wants to help the child realise that his construction is not the same as the model and that it needs to be reconstructed. The adult tries to accomplish this by questioning the child's answer and looking very surprised: "c'est le même chose?" (Is it the same?). The child returns again to his previous answer and points out which houses are the same. The adult's utterance results again in a mismatch between intended and perceived meaning. From the child's point of view, the adult's repeated questioning must be very confusing and each time when the adult repeats her question the child might perceive it as negative feedback.

sequence: (75 - 77)

1. The child opens the door of the red house [75] → The child eye gazes at the adult [76] → The adult signs something and utters: "bizarre" [77]

Ψ    The child opens the door of the red house. This action could be interpreted as an attempt to decode what the adult's intentions are with the girl standing by the lake. After all, the child is asked to imagine a 'girl'. = Intentions-decoding strategy. Maybe he is expected to play the role of this girl. So, the child opens the door of the red house (which is an action that is appropriate for the girl to do). After this he gazes at the adult to receive feedback on his action. The adult signs something and utters: "bizarre" which is difficult to interpret but might be a reaction on the child's opening the door of a house.

sequence: (78 - 80)

1. The child removes the other houses [78] → The child gazes at the adult [79] → The adult asks if both villages are the same [80]

Ψ    From the behaviour of the child we can infer that the adult asked the child to continue with the construction of the village. The child removes the other houses and then gazes at the adult for feedback in order to decode his intentions = Intentions-decoding strategy. The adult again asks if the villages are the same.

52

1. The adult asks if both villages are the same $^{=80}$ → The child looks at his village $^{=81}$ → The child looks at the adult's village $^{=82}$ → The child gazes at the adult $^{=83}$ → The adult asks if both villages are the same $^{=84}$

Ψ      The adult asks if both villages are the same, in other words she wants to know if the child shares the same definition of the task. If the child answers affirmative, the adult might infer that the child is aware that the model is in some way relevant for the task. It does not mean that the child per definition knows in what way the model is relevant.

The child however, may also answer affirmative for another reason: namely, if he thinks it is the answer that the adult would like to hear.

The child reacts by looking at the model-village then by looking at his village. After this he gazes the adult, searching for interaction cues = Intentions-decoding strategy. The adult asks again if both villages are the same.

1. The adult asks if both villages are the same $^{=84}$ → The child nods "yes" $^{=85}$

Ψ      The adult asks if both villages are the same. The child nods "yes", which is interpreted by the adult as a sign that the child's finished. They can now proceed with the construction of the second village.

*In general: This particular type of interaction is based on a fragile mutual understanding which necessitates a constant reconstruction. A few times the child does not seem to understand the adult, and the adult does not seem to understand the child. Their definition of the task is different. The child's definition of the task is to play with the houses and to tell the adult which houses are the same. Most of the problems in this interaction result from the adult's being not very explicit. But the adult is faced with a very difficult task. Her role as an experimenter demands from her to stay neutral. Of course she can be more explicit, but then she has to depart from her neutrality more rigorously and give the child clues concerning the expected answers and behaviour. Hence, she will come in conflict with her role and with the script. The child is attentive to the task and makes the best out of the adult's ambiguous behaviour. There are instances of smooth communication as well. Characteristic is that they all start of after the adult has repaired a less successful sequence. Most not so successful sequences start of with inattentive regards of the child.*

INTERACTION 2:

ADULT - JULIEN (6 years; degree of deafness: severe-profound)
POST-TEST: FIRST ITEM

## VERBAL AND NON-VERBAL TRANSCRIPTION OF INTERACTION

A.1: Alors, Julien, j'aimerais [1] ↔

  c: [takes h1c] [2] [looks at v1] [3]

>A: que toi [4]

  c: [looks at h1c] [5]

>A: tu construises exactement [6] ↔

  c: [eye gazes at A] [7]

>A: le même village [8] /

  c: [looks at h1c] [9]

>A: la (points at spot near lake2) [10]

  c: [looks at spot near lake2] [11]

>A: fille [12] ↔

  c: [eye gazes at A.] [13]

>A: elle voie le même chose que là ↔ (points at spot near lake1) [14]

C.1: [looks at v2] [15] [places h1c] [16] [looks up at A.] [17]

A.2: continue + (s) [19]

  c: [looks at v1] ↔ [takes h3c] [20] [places h3c] [21] [looks at v1] [22] [takes h2c] [23]
   [places h2c] [24] [eye gazes at A.] [25]

A.3: même? + (s) (points v1 and points v2) [26]

C.3: [signs: même] [27] [points with both hands at h1c and h1a, then h2c and h2a, then h3c and h3a] [28]

[s] [looks up at A for one moment.] [29] [relocates h3c] [30]

A.4: même + (s)? [31]

C.5: [signs: même] [32]

A.6: Oui? [33]

C.6: [+] oui [34]

## ENUMERATION OF SEQUENCES

First, a description is given of what actually happens in the interaction. The numbers of acts
in superscript refer to correspondent numbers of acts in the transcription.
Second, the sequence is explained, indicated with the symbol: Ψ
→ =    next action/utterance or: leads to
*italics* ↔ *italics:*  occurrences of simultaneity
NB:  The strategies are underlined

sequence: (1 - 6)

1. The adult attracts the attention of the child [=1] → *The adult starts to request the child to
construct the village according to the model* [=4+6] ↔ *The child takes the red house and
looks at the model* [=2+3] *Then he looks at his red house* [=5]

Ψ  The adult first start with calling the attention of the child. In this case it is not termed
a strategy because there is no inattention which needs to be repaired.
The adult starts immediately with formulating the request to construct the village. The child
does not pay attention to the adult but goes directly in the task. Although the adult can be
certain that the child does not receive her message, she does not attract the child's attention

which is a prerequisite for effective communication with a deaf child. One explanation for this is that the adult does not view this post-test and the interaction as a new encounter. On the contrary, she acts as if she effectively reminds herself of the pre-test and this "idea" plays an active part in the post-test. Her starting point is that the child already knows what is expected from him due to his experience in the pre-test. In the adult's view the child gives evidence of this knowledge by directly engaging in the task. In sum, there is no need for the adult to have the undivided attention of the child if we accept the idea of a so-called "postsumption" which is constructed during the pre-test and interaction phase and is now incorporated in the post-test.

sequence: (7 - 11)

1. *The adult continues to formulate the request* $^{=6}$ $\leftrightarrow$ *the child gazes the adult for a brief moment during the formulation* $^{=7}$ $\rightarrow$ *The adult continues her formulation* $^{=8}$ $\leftrightarrow$ *The child looks at his red house* $^{=9}$ $\rightarrow$ The adult points $^{=10}$ $\rightarrow$ The child looks at the pointed spot $^{=11}$

Ψ    During the formulation of the request the child gazes at the adult for one brief moment. This might be called a <u>control strategy</u> to determine if that what the adult communicates is the same as in the pre-test. That is, if it matches with his 'postsumption'. When the child has enough information to decide this, he focuses again on the task and he provides an appropriate reply when the adult makes a statement. The child is thus seen in behaviour which is in accordance with the idea of a 'postsumption'

sequence: (12 - 14)

1. *The adult indicates that the two girls have to see the houses exactly the same* $^{=12+14}$ $\leftrightarrow$ *The child gazes the adult briefly* $^{=13}$

Ψ    The child again gazes briefly the adult, probably to check if his postsumption matches with the situation = <u>Control strategy</u>.

sequence: (15 - 19)

1. The child looks at his cardboard-plate $^{=15}$ $\rightarrow$ He places the red house $^{=16}$ $\rightarrow$ He gazes the adult $^{=17}$ $\rightarrow$ The adult prompts him to go on $^{=19}$ $\rightarrow$ He engages in the task $^{=20}$

Ψ    The child engages in the task. He gazes the adult in order for feedback concerning his action = <u>Feedback eliciting strategy</u>. This action is effective, because the adult reinforces the action of the child.

sequence: (19 - 24)

1. The adult prompts the child to continue $^{=19}$ $\rightarrow$ The child engages passive and active in the task $^{=20-24}$

Ψ    The adult has set the child back on the task by reinforcing his previous task-engagement. The child knows now that what he is doing is valued by the adult.

sequence: (25 - 26)

1. The child gazes the adult $^{=25}$ $\rightarrow$ The adult asks if both villages are the same $^{=26}$

Ψ    The child has placed all the three houses and probably recalls from his previous experience that he has done everything the adult wants him to do. He looks up to the adult to communicate this knowledge = <u>Feedback eliciting strategy</u>. The adult interprets this message likewise and asks if both villages are the same to be sure that the child is finished.
sequence: (26 - 28)

1. The adult asks if both villages are the same $\rightarrow$ The child signs: "the same" $\rightarrow$ The child points at both red houses, then both yellow houses and both blue houses

55

Ψ     The adult wants to know if both villages are the same. The child however, gives in his answer his interpretation of the adult's question and points to the houses which are equal in colour. From the adult's perspective, the intended meaning of her question does not match the perceived meaning of the child.

sequence: (28 - 30)

1. The child points at both red houses, then both yellow houses and both blue houses → The child looks up to the adult one brief moment → The child relocates the blue house

Ψ     The child answers the adult's ambiguous question and looks up for just one moment at the adult. Then he suddenly relocates a house. He doesn't wait for the adult's response on his action. It looks as if the child rethinks the pre-test and suddenly becomes aware of the adult's frequent questions after he has constructed the village. The child does not wait for the adult to ask the, in his view "strange question" but anticipates on it by relocating one of the houses, because "he remembers that this is what the adult wants him to do."

sequence: ( 30 - 34)

1. The child relocates the blue house → The adult asks if both villages are the same → The child signs: "same" → The adult asks "Yes"? → The child signs and says "yes"

Ψ     After the child has displaced the house, the adult wants to know if the child has finished. The child signs: "same" but the adult interrupts his answer by asking "yes" (is it the same?). Again the adult react according a postsumption. She expected that the child would again point out which houses are the same. To prevent this from happening, she interrupts the child. The child interprets the utterance of the adult as an answer which the adult wants to hear. The child answers: 'yes'.

*In general: In this interaction the establishment of intersubjectivity is also very problematic. Both interlocutors refer to previous experience in the pre-test but in this case this does not lead to improved performance on the part of the child. Comparing his performance in pre- and post-test, he has not made any progress. The definition of the task remains different for the child as it is for the adult. The adult is not very explicit in the instruction of the task. The child has problems with the concept of "the imagned girl" and with the 'verification question' of the adult. The child has not improved his performance from pre-test to post-test.*

56

INTERACTION 3:

ADULT - STEFANY (8 years; degree of deafness: moderate)
PRE-TEST: FIRST ITEM


## VERBAL AND NON-VERBAL TRANSCRIPTION OF INTERACTION

A.1:   Alors, là ↔ (points v1) moi j'ai construit un village. Dans ce village il y a trois
      maisons [1] t'as vue? [2]
   c: [+] [3]

>A:   un deux trois ↔ (points h1a, h2a, h3a) [4]
      Là ↔ (points lake 1) on va dire que c'est mon lac [5] / (+) [6]
   c: [+] [7]

>A:   Et puis j'aimerais maintenant que toi tu construises exactement le même village
      là ↔ (indicates v2). Puis ça ↔ (points lake2) [8]

C.1:   [looks away from A to watch v1] [9]
A.2:   (bends forward in C's visual field) [10]
   c: [eye gazes at A] [11]

>A:   on va dire que c'est ton lac [12] /
   c: [±] [13] ↔

>A:   d'accord? [14] Mais attention, là / on va imaginer que là ↔ (points lake1) tout
      près du lac il y a une personne [15] ↔ c: [bends forward to see the spot pointed by the adult
      see: 15] [16] [eye gazes at A] [17]

>A:   une fille d'accord? [18]
C.2:   [+] [19]
A.3:   Et puis/ là ↔ (points lake2) [20]
   c: [looks for one moment at the spot pointed by the adult see: 15] [21] [eye gazes at A] [22]

>A:   tout près de ton lac là ↔ (points to lake2) on va imaginer que il y a aussi une fille.
Puis les deux filles, il faut qu'elles voient les maisons exactement le   même chose [23]
C.3:   [looks at spot pointed by the adult see: 15] [24]
A.4:   D'accord? [25]
C.4:   [+] [26]
A.5:   Tu peux construire le village? [27]
C.5:   [takes h1c] [28] ↔
A.6:   exactement le même village [29]
C.6:   [looks at h1c] c'est fermée [30]
A.7:   Oui [31]
C.7:   [looks at v1] [places h1c] [takes h3c] [looks at v1] [puts back h3c and takes h2c] [looks at  v1]
      [places h2c] [looks at v1] ↔ [takes h3c] [turns h3c to another side] [looks at v1]   [turns h3c again
      to another side] [looks at v1] [places h3c] [32] [eye gazes at A] [33]
A.8:   C'est exactement le même chose là ↔ (points v2) là ↔ (points v1) [34]
C.8:   [looks at v2] [looks at v1] [takes h3c and displaces it minimal] [35] [leans back in her chair] [36]
A.9:   Comme ça, ça va? c'est le même? [37] ↔
C.9:   [looks at v1] [looks at v2] [takes h2c and displaces it minimal] [looks at v1] [removes h2c a little]
[38] [leans back in her chair] [39] [looks at v1] [looks at v2] [40] // oui [41]
A.10:  Ça va comme ça? [41] d'accord [42]

## Enumeration of strategy sequences

First, a description is given of what actually happens in the interaction. The numbers of acts in superscript refer to correspondent numbers of acts in the transciption.
Second, the sequence is explained, indicated with the symbol: Ψ

| | |
|---|---|
| → = | 'leads to' or: 'is followed by' |
| *italics* ↔ *italics:* | occurrences of simultaneity |
| NB: | The strategies are <u>underlined</u> |

sequence: (1 - 7)

The adult starts explaining the task $^{=1}$ → The adult asks a confirmation question $^{=2}$ → The child responds affirmative $^{=3}$ → The adult points out the three houses $^{=4}$ → The adult continues the instruction $^{=5}$ → The adult elicits feedback $^{=6}$ → The child nods $^{=7}$

Ψ    The adult starts to explain the task and the child is paying attention. The adult asks a confirmation question to ensure herself that the attention of the child remains focused on her. We can consider this as a <u>precaution strategy</u>. The communication develops smoothly.

sequence: (8 - 11)

1. The adult continues to present the instruction $^{=8}$ → The child looks at v1 $^{=9}$ → The adult bends forward in the child's visual field $^{=10}$ → The child gazes the adult $^{=11}$

Ψ    During the presentation of the instruction, the child looks suddenly at v1. It looks as if the child is already engaging in the task. After all the adult has said that she wants the child to construct the same village. So the child looks at v1 to see where she has to place the houses on v2. However, the adult wants to repair the contact, to continue with the task-instruction and succeeds in this endeavour by using a <u>non-verbal attention management strategy</u>.

sequence: (12 - 27)

1. The adult continues to present the instruction $^{=12}$ → *The child nods* $^{=13}$ ↔ *The adult asks: 'd'accord'* $^{=14}$ → The adult continues to present the instruction $^{=15}$ → The child bends forward to have a better view of lake1 $^{=16}$ → The child gazes the adult again $^{=17}$ → The adult continues to present the instruction and asks: 'd'accord' $^{=18}$ → The child nods 'yes' $^{=19}$ → The adult continues to present the instruction $^{=20}$ → The child looks at the indicated spot near lake1 $^{=21}$ → The child gazes the adult again $^{=22}$ → The adult continues to present the instruction $^{=23}$ → The child looks at the indicated spot at v1 $^{=24}$ → The adult asks: 'd'accord' $^{=25}$ → The child nods 'yes' $^{=26}$ → The adult requests the child to construct the village $^{=27}$

Ψ    This sequence shows again an example of smooth communication. The adult continues to present the instruction and along the way she checks if the child understands. Each time the child indicates that she does, the adult can proceed. Another remarkable aspect, which can only be observed at the video recording is that the child's gaze goes back and forward, from task to adult. The adult does not intervene when the child is not attentive to the instruction. It looks as if the adult knows that this child has a moderate deafness because sometimes she even presents information when the child is not looking at her and cannot watch the signs and read the lips. However, the child immediately pays attention to the adult again when the latter continues the instruction. So there is no need for the adult to intervene in moments of inattention during the instruction.

1. The child takes the red house $^{=28}$ → The adult adds that the village has to be the same $^{=29}$ → The child looks at the red house and remarks that it is closed $^{=30}$ → The adult confirms this $_{=31}$

Ψ     The child is actively engaged in the task. The adult provides the child with additional information which in this case is a strategy to bring the child focus on the adult's premise. The child however, does not perceive this information the way the adult has intended. The child pays attention to features that are not relevant for a successful task-performance and remarks that the door of the red house is closed. The adult accepts the child's remark but does not go into details because of the little relevance it has for her intentions with the task.

sequence: (32 - 36)

1. The child places all the houses $^{=32}$ → The child gazes the adult $^{=33}$ → The adult asks if both villages are exactly the same $^{=34}$ → The child looks at v1, then at v2 and displaces the blue house minimal $^{=35}$ → The child leans back in her chair $^{=36}$

Ψ     The child is actively engaged in the task and places all the houses. When she has finished the construction of the village, she looks up at the adult to give the adult the message: "I have finished" and to receive some feedback. So we can call this a feedback eliciting strategy. The adult however needs to know if the child has really finished, so she asks if it both villages are exactly the same. The child interprets the question of the adult as an indication that the two villages are not exactly the same, that is that her construction is not good. The child acts according to the didactic contract in which this kind of questions are valued as negative feedback. The child looks at both constructed villages and changes minimally the position of the blue house on v2. After this, being confident that the adult will now be satisfied, the child leans back in her chair to communicate that she has finished..

sequence: (37 - 42)

1. The adult asks again if the child has finished $^{=37}$ → The child looks at v1, then at v2 and displaces the yellow house minimal $^{=38}$ → The child leans back in her chair $^{=39}$ → The child looks at v1 and at v2 $^{=40}$ → The child says: "yes" $^{=41}$ → The adult reformulates the answer of the child $^{=42}$

Ψ     The adult wants to have the child's confirmation that the two villages are the same. The child again interprets this question as negative feedback and she changes the position of the yellow house on v2. When she has finished she leans back in her chair. She looks at v1 and v2 and says "yes". This needs to be interpreted as an answer on the adult's initial question: "Is it exactly the same?" The adult verbalises the possible meaning of "yes", by saying: "ça va comme ça? d'accord"

*In general: In the absence of explicit feedback from the child whether she understands the adult, the adult is seen to elicit acknowledgements by using non-verbal as well as verbal strategies (nodding "yes" with questioning eyes, or asking "OK"?). These are normal processes.*

*The child seems to have problems with the concept of the imagined person. She expresses this by looking repeatedly at the spot of this person, pointed at by the adult in act [15] (see [16, 21, 24]). The adult, however, does not notice this. Furthermore, we see that the child's definition of the task is different from that of the adult: when the child seems to be finished with the construction of the village, she is asked by the adult to confirm this. The adult's question: "are the two villages exactly the same" is interpreted by the child as negative feedback. According to the child, it is obvious that the two villages are not exactly the same, otherwise the adult would not ask her this question.*

*Hence, the child changes the position of the houses. She removes them so little, that it seems that the word "exactly" in the adult's question has got a very important meaning. The*

child might think that the adult's definition of the task is to place the houses <u>exactly</u> like those placed on the model village. But the only intention of the adult is to have an explicit confirmation that the child is finished with the construction of the village. Thus, this child is very sensitive to the word "exactly". It seems that the adult is aware of this problem for she reformulates her question in A9: "Is it OK, like this? Is it the same?" She doesn't use the word "exactly" anymore. However the child reacts in the same way by displacing the position of a house.

INTERACTION 4:

ADULT - STEFANY (8 years; degree of deafness: moderate)
POST-TEST: FIRST ITEM

## VERBAL AND NON-VERBAL TRANSCRIPTION OF THE INTERACTION

A.1: Alors, là ↔ (points v1) il y a mon village et puis j'aimerais que toi tu construises exactement le même village là ↔ (points v2) [1]

   c: [+] [2]

>A: Ça ↔ (points lake2) c'est ton lac et ça (points lake1) c'est le mien, d'accord [3]

C.1: [+] [4]

A.2: Et puis, tu te rappelles qu'on a dit on imagine que (points at spot near lake2) tout près du lac (points at spot near lake1) une fille [5]

Là ↔ (points at spot near lake2) il y a aussi une fille. Puis les deux filles, elles voient les maisons exactement à la même place // ça va? [6]

C.2: [takes h1c and looks at v1] [places h1c upon v2] [looks at v1] [removes h1c a     little] [7] [pulls the table closer by] [8]

A.3: Non non, t'attends, ne bouge pas, bouge la chaise [9]

C.3: [moves her chair] [10]

A.4: Voilà (...) [11]

C.4: [looks very attentively at h1a] [determines the distance between lake2 and h1c by using her    fingers] [12] [looks at v2] ↔ [removes h2c a little] [looks at h2a]

[removes h2c again a little] [looks at h2a] [looks at h2c and removes it again] [13] [takes h3c] [looks at v1] [positions h3c upon v2] [looks at v1] [removes h3c a little] [14] [leans back in her chair] [15] ↔ voilà [16] [eye gazes at A] [17]

A.5: C'est la même chose? [18]

C.5: Oui [19]

## Enumeration of sequences

First, a description is given of what actually happens in the interaction. The numbers of acts in superscript refer to correspondent numbers of acts in the transcription.
Second, the sequence is explained, indicated with the symbol: Ψ

| → | = | 'leads to' or: 'is followed by' |
| *italics* ↔ *italics:* | | occurrences of simultaneity |
| NB: | | The strategies are underlined |

sequence: (1 - 4)

1. The child pays attention to the adult and the adult presents information [=1] → The child acknowledges [=2] → The adult continues to present information and elicits confirmation of understanding by saying: 'd'accord' [=3] → The child nods: 'yes' [=4]

Ψ     This is a sequence of smooth communication. The child provides the adult with positive evidence of understanding so that the adult can continue with the instruction. The adult elicits confirmation of understanding and the child reacts appropriate (with head nods).

1. The adult explicitly refers to previous experience and continues to provide information $^{=5}$
   → The adult continues to provide information and when she has finished she invites the
   child to construct the village $^{=6}$ → The child engages in the task $^{=7}$

Ψ     Again this is a smooth sequence. The adult refers back to the pre-test and is very
brief in her instruction. She indirectly invites the child to enter in the task by lowering her
intentonation, waiting a moment and saying: "ça va"?. The child engages in the task.

sequence: (8 - 12)

1. The child pulls the table closer by $^{=8}$ → The adult intervenes and asks the child not to pull
   the table but to move the chair $^{=9}$ → The child moves her chair $^{=10}$ → The adult says:
   "voila" $^{=11}$ → The child engages in the task $^{=12}$

Ψ     The child pulls the table closer by. The adult does not approve this and asks the
child to move the chair instead of the table. The child understands it and complies with the
request. With saying "voilà" the adult marks a boundary in the discourse which in this case
has the meaning of putting the child back on the task again. The child's interpretation
corresponds with the adult's intention: she engages in the task again.

sequence: (12 - 19)

1. The child puts down h1c very precisely upon v2 $^{=12}$ → The child puts down h2c upon v2
   $^{=13}$ → The child puts down h3c very precisely upon v2 $^{=14}$ → The child leans back in her
   chair $^{=15}$ → The child says: "voilà" $^{=16}$ → The child looks up to the adult $^{=17}$ → The adult
   asks if it is the same $^{=18}$ → The child confirms it is $^{=19}$

Ψ The child works very accurate. It seems as if she is rethinking the pre-test in which
the word "exactly" had a central meaning for her. The child places the three houses upon
v2. She indicates herself that she has finished. But how does she know that there is nothing
more to do? The adult did not tell the child beforehand when the task is done. The
explanation could be that the child draws upon her personal experiences acquired in the
pre-test and probably in the interaction phase.

*In general: Both adult and child profit from experience with the task and with each other
gained in the pre-test and possibly in the interaction phase. We see that the adult is very
brief in the formulation of the instruction emanating from the idea that the child remembers
essential parts of the task. The child seems to behave according to the adult's starting point.
She performs the task very well.*

INTERACTION 5:

ADULT - MARJORIE (9 years; degree of deafness: severe-profound)
PRE-TEST: FIRST ITEM

## VERBAL AND NON-VERBAL TRANSCRIPTION OF INTERACTION

A.1: Là ↔ (indicates v1) c'est mon village (indicates v1) [1]

    c: [+] [2]

>A: il y a trois maisons [3]

    c: [+] [4]

>A: Ça ↔ (points lake1) [5]

C.1: [...] + s [6]

A.2: c'est mon lac [7]

    c: [+] [8]

C.2: lac [9]

A.3: (+) [10] d'accord? [11] Puis j'aimerais maintenant que toi tu construises [12]

    c: [+] [13]

>A: exactement le même village [14]

    c: [+] [15] /

>A: là (points v2) [16]

    c: [+] [17] oui [18]

>A: Ça ↔ (points lake2) c'est ton lac ↔ [19]

C.3: lac [20] [±] [21] ↔

A.4: d'accord? [22] Mais attention/ là (points at spot near lake1) tout près du lac [23]

    c: [+] [24]

>A: on va imaginer il y a une fille mmm? [25]

    c: [+] [26]

>A: Même chose là (points at spot near lake2) [27]

    c: [+] [28]

>A: tout près de ton lac il y a aussi une fille [29]

    c: oui [30].

>A: Les deux filles elles voient les maisons [31]

    c: [+] [32]

>A: exactement à la même place [33]

    c: oui [34]

>A: d'accord? [35]

(gets up, signs the child to wait a moment and takes a transparent paper) [36] Ça c'est pour me rappeller bien où toi tu as placé ↔ [37]

    c: [±] [38]

>A: les maisons. Après je note avec les stylos [39] (attaches the transparent paper on the child's cardboard plate) [40]

{This is usually done before the instruction is given. The experimenter has forgotten to do this. So she had to do this now}

Voilà, alors est-ce que c'est possible que toi tu construises le même village là↔ (points v2) [41]

    c: [+] [42]

>A: tu regarde bien [43] ↔ (points v1)

C.4: [takes h1c, places it on v1] [takes h3c] [looks at v1] [removes h1c] [looks at v1] [looks at v2]

[turns h3c to another side] [places h3c while looking regularly at v1] [takes h2c and pays attention to v1] [places h2c] [44] [looks up at A] [45]

A.5: Fini? [46] C'est exactement le même chose là (points v1) là (points v2) [47]

C.8: [+] [48]

## Enumeration of sequences

First, a description is given of what actually happens in the interaction. The number of acts in superscript refer to correspondent numbers of acts in the transcription.

Second, the sequence is explained, indicated with the symbol: Ψ

| | | |
|---|---|---|
| → | = | 'leads to' or: 'is followed by' |
| *italics* ↔ *italics:* | | occurrences of simultaneity |
| NB: | | The strategies are <u>underlined</u> |

sequence: (1 - 9)

1. The adult presents information [=1] → The child acknowledges [=2] → The adult continues to present information [=3] → The child acknowledges [=4] → The adult continues to present information [=5] → Incomprehensible utterance from child [=6] → The adult continues to present information [=7] → The child acknowledges [=8] → The child repeats the last word of the adult's utterance [=9]

Ψ    The adult starts to explain the task. The child pays attention to the adult and her frequent acknowledgements carry the instruction forward. Besides this the child is actively engaged in the instruction and repeat parts of it [see: 9], which has the function of giving positive evidence of understanding.

sequence: (10 - 35)

1. The adult reinforces act [nr. 9] by nodding "yes" [=10] and saying: 'd'accord' [=11] → The adult continues to present information [=12] → The child acknowledges [=13] →
The adult continues to present information [=14] → The child acknowledges [=15] → The adult continues to present information [=16] → The child acknowledges [=17] and says "yes" [=18] →
The adult continues to present information [=19] → *The child repeats the last word of the adult's utterance* [=20] *and nods 'yes'* [=21] ↔ *The adult asks: 'd'accord'* [=22] → The adult continues to present information [=23] → The child acknowledges [=24] → The adult continues to present information and elicits a confirmation of understanding by exclaiming: "mmm" [=25] → The child nods 'yes' [=26] → The adult continues to present information [=27] → The child acknowledges [=28] → The adult continues to present information [=29] → The child says: "yes" [=30] → The adult continues to present information [=31] → The child acknowledges [=32] → The adult continues to present information [=33] → The child says: "yes" [=34] → The adult asks: 'd'accord' [=35]

Ψ    The instruction proceeds with no indications of problems or misunderstandings. There is little need for the adult to elicit confirmations of understanding because the child acknowledges frequently. It seems that we are confronted with a child who, in spite of the severity of her deafness, is extremely aware of communication processes and their purposes.

sequence: (36 - 48)

1. The adult gets up, signs the child to wait and takes a transparent paper [=36] → The adult explains the function of the transparent [=37] → The child acknowledges [=38] → The adult continues to explain [=39] → The adult attaches the transparent paper [=40] → The adult requests the child to construct the village [=41] → The child nods: "yes" [=42] → The adult

gives additional information $^{=43}$ → The child engages in the task and places all the houses while looking regularly at the model $^{=44}$ → The child looks up at the adult $^{=45}$ → The adult asks if the child has finished $^{=46}$ and wants to know if it is exactly the same village in comparison with the model $^{=47}$ → The child nods "yes" $^{=48}$

Ψ      The adult suddenly gets up to take a transparent paper, which she has forgotten to attach at the cardboard plate in front of the child. Being aware of this sudden break in the instruction, the adult explains her behaviour. The child shows no signs of incomprehension. She seems to know that the activity of the adult is not significant for her and she does not go into the details of it. The adult asks the child to construct the village, but she gives additional information [see: 43] It could be that the adult felt obliged to say this after the break she had initiated.

*In general: This interaction does not confront the interlocutors with insurmountable problems. Throughout the instruction the child shows active involvement by giving frequent acknowledgements and sometimes by repeating parts of the adult's utterance. This is interpreted by the adult that the child understands and follows. Only one time a break in the course of the instruction can be observed (see [36]) but the adult explains her behaviour in such a way that the incident remains nothing more than just an incident.*
*In sum this interaction is a clear example of smooth communication. The child performs the task successfully.*

## INTERACTION 6:

ADULT - MARJORIE (9 years; degree of deafness: severe-profound)
POST-TEST: FIRST ITEM

## VERBAL AND NON-VERBAL TRANSCRIPTION OF INTERACTION

A.1: Tu regardes <u>bien là</u> ↔ (<u>indicates v1</u>) et puis j'aimerais que toi tu construises exactement le même village <u>là</u> ↔ (<u>indicates v2</u>) [1]

    c: Oui [2]

>A: Rappelle <u>ça</u> [3] ↔ (<u>points lake2</u>) c'est ton <u>lac</u> [4] ↔

C.1: <u>Mon lac</u> [5]

A.2: <u>Ça</u> ↔ (<u>points lake1</u>) <u>mon lac</u> [6] ↔

C.2: <u>Ton lac</u> [7]

A.3: <u>Là</u> ↔ (<u>points a spot near lake1</u>) [8] ↔

    c: [<u>takes h1c</u>] [9]

>A: <u>Là</u> ↔ (<u>points at a spot near lake2</u>) tout près du lac on imagine que il y a deux filles. Les deux, il faut qu'elles voient les maisons exactement à la même place[10]

C.3: [looks at h1c] [looks at v1] [places h1c] [looks at v1] [removes h1c a little] [<u>looks at v1</u>] ↔ [<u>takes h2c</u>] [looks at v1] [turns h2c] [looks at v1] [looks at h2c] [looks at v1] [looks at    h2c] [looks at v1] [looks at h2c] [places h2c] [11]

A.4: (imitates the way C. has placed h2c) [12]

    c: [eye gazes at A] [13]

>A: (smiles at C) [14]

C.4: [takes h3c] [looks at v1] [looks at h3c] [looks at v1] [places h3c] [looks at v1]    [removes h3c a little] [15] [leans back in chair] [16] j'ai fait / fini [17]

A.5: Fini? [18] C'est la même chose? [19]

C.5: [+] [20]

sequence: (1 - 10)

1. The adult presents information and tells the child what she wants her to do [=1] → The child acknowledges [=2] → The adult reminds the child at the pre-test (rappelle ça...) [=3] and continues to present information [=4] → The child repeats the utterance of the adult [=5] → The adult continues to present information [=6] → The child repeats the utterance of the adult [=7] → *The adult continues to present information* [=8] ↔ *The child takes the red house* [=9] → The adult continues to present information [=10]

Ψ    The adult starts to explain the task but she does this less extensive than in the pre-test. The adult directly refers to the pre-test when she says: "recall that" The child seems to remember the pre-test when she correctly identifies lake2 as "her lake" and lake1 as 'the adult's lake [see: 5 + 7]
The adult continues with the instruction while the child takes the red house. It looks as if the child already knows what she has to do and acts in anticipation of this. The adult does not intervene. An explanation could be that she reminds herself to the pre-test which progressed so smoothly and therefore decides not to intervene. She finishes her instruction.

1. The child engages in the task and places the red and the yellow house $^{=11}$ → The adult imitates the way the child placed the yellow house $^{=12}$ → The child gazes the adult $^{=13}$ → The adult smiles at the child $^{=14}$ → The child engages back in the task again and finally places the blue house $^{=15}$ → The child leans back in her chair [16] → The child says that she's finished $^{=17}$ → The adult asks if the child is finished to be sure she has heard it correctly $^{=18}$ she asks if it is the same $^{=19}$ → The child confirms that it is $^{=20}$

Ψ      The child constructs the village while regularly paying attention to the model. When she places yellow house upon her ground-plan (which she does in a funny way) the adult imitates the way she did this by way of a joke. The child looks up to decode the adult's attention = <u>intentions decoding strategy</u>. When she looks in the smiling face of the adult, she seems to become aware that it was just a joke. The child continues with the task. She leans back in her chair and says that she's finished. Out of habit the adult asks the child's confirmation that the two villages are the same. The child confirms this.

*In general: This encounter develops smoothly. Even the adult's joke does not result in problems of understanding.*

INTERACTION 7:

ADULT - SIGRID (17 years; degree of deafness: profound)
PRE-TEST: FIRST ITEM


## VERBAL AND NON-VERBAL TRANSCRIPTION OF INTERACTION

A.1:   Alors, là (points v1) moi j'ai construit mon village[1]

   c:  [+][2]

>A:   Ça (points lake1) c'est mon lac[3]

Puis j'aimerais maintenant que toi tu construises exactement le même village là ↔ (points v2)[4]

   c:  [±][5] ↔

>A:   sur ta planche[6]

Ça (points lake2) on va dire que c'est ton lac[7] / d'accord?[8]

Mais attention on va imaginer (points at spot near lake1) là il y a une personne // garçon ou bien une fille[9]

C.1:   [garçon][10]

A.2:   Garçon.[11]

Là ↔ (points at spot near lake1) il y a un garçon. Là ↔ (points at spot near lake2) près de ton lac il y a aussi un garçon / là ↔ (points at spot near lake2) Puis les deux garçons près du lac / il voient les maisons exactement à la même place[12] / d'accord?[13]

C.2:   Oui[14]

A.3:   Super[15] /

Tu peux construire le village?[16]

C.3:   [+][17] [does not engage in the task but eye gazes A][18] //

A.4:   Tu place / les maisons[19] (takes h3c and moves it in the direction of v2, then places it back on the table in front of C.)[20]

C.4:   [+][21] [looks at the houses] / [takes h1c][22] ↔

A.5:   Tu regardes là (points v1)[23]

C.5:   [shows h1c to A][24]

A.6:   Toi qui choisis[25]

C.6:   [s][26]

A.7:   Mais, c'est pas difficile![27] (smiles)[28]

C.7:   [points at v2][29]

A.8:   Tu regardes[30] / tu te rappelles / là ↔ (points lake1) au bord de mon lac il y a un garçon / (points at spot near lake2) là (points at spot near lake2) aussi il y a un garçon. Puis les deux ils voient exactement le même chose[31]

Là ↔ (points v1) / là ↔ (points v2) ils voient les maisons exactement à la même place[32] (+)[33]

C.8:   [touches h1a][34] [looks up at A][35] [looks at h1c] [takes h1c and places it upon v1 beside h1a][36]

A.9:   (touches C's arm)[37]

C.9:   [looks up at A][38]

A.10:   Ça ↔ (points v1) c'est mon village[39] OK[40] / et puis j'aimerais que toi tu fasses exactement le même village là ↔ (points v2)[41] d'accord?[42]

Alors ↔ (takes h1c from v1)[43] / là ↔ (points v1) il y a trois maisons et puis là ↔ (points houses) trois maisons aussi,[44] d'accord?[45]

C.10:   Oui[46]

A.11: Tu places les maisons pour que (indicates the two boys) les deux garçons ils voient les maisons exactement à la même place [47]

    c: [+] [48] //

>A: Là (points at spot near lake1) mon garçon il voit mes maisons // là (points at spot near lake2) ton garçon il voit tes maisons [49] (takes h1c and h3c and moves them in the direction of v2, then places them back on the table in front of C.) [50] (+) [51] ↔ d'accord? [52]

C.11: [takes h3c] [places h3c upon v2] [looks at v1] [displaces h3c] [takes h1c] [turns h1c to another side] [places h1c upon v2] [looks at v1] [displaces h1c] [53] [looks up at A] [54]

A.12: (points at h2c) [55]

C.12: [takes h2c] [looks at v1] [places h2c upon v2] [looks at v1] [turns h2c to another side] [56]    [looks up at A] [57]

A.13: C'est exactement le même chose là ↔ (points v1) là ↔ (points v2) [58]

C.13: [looks at v1] [looks at v2] [removes the houses to place them on another spot on v2] [59] [looks up at A] [60]

A.14: Ça c'est le même chose? [61] oui? [62]

C.14: Oui [63]


## Enumeration of sequences

First, a description is given of what actually happens in the interaction. The number of acts in superscript refer to correspondent numbers of acts in the transcription.
Second, the sequence is explained, indicated with the symbol: Ψ
→    =            next action/utterance or: leads to the following action/utterance
*italics* ↔ *italics:*     occurrences of simultaneity
NB:    The strategies are underlined

sequence: (1 - 11)

1. The adult presents information [=1] → The child acknowledges [=2] → The adult continues to present information [=3+4] → The child acknowledges [=5] → The adult continues to present information [=6+7] and asks: 'd'accord' [=8] → The adult continues to present information: "There is a person standing by the lake, a boy or a girl" [=9] → The child signs: "boy" [=10] → The adult accepts the child's choice: "boy" [=11]


Ψ    The adult starts to explain the task. The child pays attention to the adult and shows understanding by giving acknowledgements. The adult explains that there is a person standing by the lake, a boy or a girl. The child interprets this as if the adult asks her to decide whether it should be a boy or a girl and signs: "a boy". The misinterpretation of the child does not have an impact on the course of the interaction. The adult sees no need to explain to the child that it doesn't make a difference whether the person is a boy or a girl. She accepts the child's choice. Maybe it was better if the adult had not added in the instruction: "a boy or a girl" The use of "or" obvious presented the child with an unimportant choice.

sequence: (12 - 23)

1. The adult presents information [=12] and finishes with: "OK?" [=13] → The child answers "yes" [=14] → The adult says: "super" [=15] → The adult asks the child if she can construct the village [=16] → The child answers: "yes" [=17] and eye gazes the adult [=18] → The adult reformulates her question "You have to place the houses" [=19] and sets an example of how the child is expected to behave [=20] → The child nods and looks at the houses [=21] / → The child takes the red house [=22] ↔ The adult adds: "you have to look at the model" [=23]


Ψ    The adult continues with the instruction and finishes with asking 'd'accord' which in this case should be interpreted as a sign that the child can start to construct the village. The

adult may expect the child to engage in the task now. However, the child interprets the adult's utterance as a question and acts likewise by giving an answer. The adult utters: 'super', which in this case can also be interpreted as a sign that the child can start to construct the village. The adult waits for this to happen but it doesn't so the adult adds: 'Can you construct the village?' This needs to be interpreted as a request. However it is not a very explicit request. The child interprets it again as a question which requires a yes/no answer. The child responds with: "yes, I can". The adult has to be more explicit and reformulates the request in more direct terms: "You have to place the houses". She gives the child an example as well of how she has to behave. The child acknowledges and looks at the houses. Just when she takes the red house, the adult tells the child what she has to do in order to succeed on the task: "You have to look at the model". This clue serves to focus the child on the adult's premise = <u>strategy to direct the child on the adult's intentions</u>

sequence: (24 - 23)

1. The child shows h1c $^{=24}$ → The adult answers: "it's up to you" $^{=25}$ → The child signs that she's uncertain $^{=26}$ → The adult reassures that it's not difficult $^{=27}$ and smiles → The child points at v2 $^{=29}$ → The adult repeats a part of the instruction $^{=30}$ and states it again in other words $^{=32}$ then the adult nods $^{=33}$ → The child touches h1a $^{=34}$ and looks up at the adult $^{=35}$ → The child looks at the red house, takes it and places it upon v1 besides h1a $^{=36}$

Ψ     The child shows the adult the red house, as if she wanted to have feedback that she's doing the right thing = <u>Feedback eliciting strategy</u>. The adult answers the question indirectly: She answers "it's you who decides".
The child signs that she has some doubts on how to act. The adult reassures the child that it is not difficult. The child points at v2, which leads the adult to decide to reformulate the instruction. She begins with calling the child's attention = <u>Verbal attention management strategy</u>. After this she reformulates the instruction and expands it. Then, she checks comprehension of the instruction and encourages the child to enter in the task again. The child touches the model's red house and looks up at the adult to search for interaction cues and feedback = <u>Feedback eliciting strategy</u>. The child does not receive this and places her red house next to the model's. In doing this, the adult's intended meaning of: "They see the houses exactly at the same spot" does not match with the perceived meaning of the child. The child interprets it in a literal sense.

sequence: (37 - 52)

1. The adult touches the child $^{37}$ → The child gazes the adult $^{=38}$ → expands a part of the instruction $^{=39}$ and asks: OK?" $^{=40}$ → The adult continues to expand the instruction $^{=41}$ and elicits a confirmation of understanding $^{=42}$ → The adult takes away the red house of v1 $^{=43}$ → The adult continues to expand the instruction $^{=44}$ → The adult asks: 'd'accord' $^{=45}$ → The child says: "yes" $^{=46}$ → The adult continues to expand the instruction $^{=47}$ → The child acknowledges $^{=48}$ → The adult continues to expand the instruction $^{=49}$ and takes h1c and h3c to move them in the direction of v2, then she places them back on the table in front of the child $^{=50}$ → The adult nods "yes" $^{=51}$ and asks: 'd'accord' $^{=52}$

Ψ     To clear the misunderstanding, the adult has to attract the child's attention = <u>Non-verbal attention management strategy</u>. She touches the child and when the child gazes at the adult, the latter reformulates the instruction again. She realises that she has to be more explicit this time. So, she gives complementary information. The child acknowledges and the adult gives the child an example of how she is expected to behave.

sequence: (53 - 63)

1. The child engages in the task and places the h1c and h3c upon v2 $^{=53}$ → The child looks up at the adult $^{=54}$ → The adult points at h2c $^{=55}$ → The child takes h2c, looks at the model and places h2c upon v2 $^{=56}$ → The child looks up at the adult $^{=57}$ → The adult asks if both

villages are the same [=58] → The child looks at v1 and v2 and removes the houses to place them on another spot [=59] → The child looks up at the adult [=60] → The adult asks if it is the same [=61] and says: "yes?" [=62] → The child says: "yes" [=63]

Ψ    The child now finally seems to have an understanding of what to do. She places h3c and h1c, and then eye gazes the adult. This can be interpreted as an attempt to communicate that she has finished. She did not place h2c, so we can conclude that the child exactly has done what the adult has demonstrated her to do. The adult only used h1c and h3c in her example, so the child only placed these houses and not h2c. There is a mismatch between the intended meaning of the adult and the perceived meaning of the child, but this time not only on a lexical but also on an activity ground.

When the adult points at h2c, she intends that the child has to place that house as well. Now we do see a match between intended and perceived meaning, as the child places h2c upon v2. She then looks up at the adult, which can be interpreted as an attempt to communicate that she has finished. The adult asks the child if the two villages are the same. The intended meaning of the verification question is to verify if the child is finished. From the behaviour of the child we can infer, however, that she perceived the question of the adult as negative feedback. Therefore, she changed the position of some of the houses. Here again, there is a mismatch between intended and perceived meaning partly caused by the adult not being explicit enough, and the child's acting according to the didactic contract in which those kind of questions also are interpreted as negative feedback.
After the child has relocated the houses, she looks up at the adult again. The adult asks again a verification question: "Is it the same? Yes?"
The child now answers "yes", but it is not unreasonable to think that the child wants to meet the adult's expectations, who indicates by saying "yes" that this is the desired answer.

*In general: This interaction is very problematic. The adult needs to be very explicit and along the way she realises this. She elucidates the instruction thoroughly to prevent the child from interpreting everything word-by-word. The child does not perform very well.*

INTERACTION 8:

ADULT - SIGRID (17 years; degree of deafness: profound)
POST-TEST: FIRST ITEM

## VERBAL AND NON-VERBAL TRANSCRIPTION OF INTERACTION

A.1:    Tu te rappelles? (...) travaillé là (points at both v1 and v2) [1]
C.1:    Oui [2]
A.2:    Oui, alors j'aimerais maintenant que toi [3]
    c:  [+] [4]
>A:    tu construises exactement le même village que là ↔ (indicates v1) là (indicates v2) [5]
C.2:    [+] [6] oui [7]
A.3:    Oui? [8] Tu fais attention là (points at spot near lake1) là (points at spot near lake2) [9]
    c:  [looks at pointed spot] [10]
>A:    Les deux filles elles voient les maisons exactement à la même place [11]
    c:  [±] [12]

C.3:    [takes h1c] [13] [looks at v1] [14] [places h1c upon v2] [15] [gets up and determines with her    fingers the distance between h1a and lake1] [16] [displaces h1c minimal] [17] [looks at v1] [18] [takes h2c] [19] [looks at v1] [20] [places h2c] [21] [looks at v1] [22] [displaces h2c] [23]    [determines the distance between h1a and the edge of v1] [24] [checks the distance between    h2c and the edge of v2 and displaces h2c a little] [25] [looks at v1] [26] [displaces h2c a little] [27] [reaches at h3c and looks at v1] [28] [places h3c] [29] [looks at    v1] [30] [displaces h3c] [31] [hits    with her hands on the table and looks briefly at the adult] [32] [corrects    the position of h1c] [33]    [s] [34] [...] [35] [looks up at A] [36]
A.4:    Fini? [37] (gets up to note) [38] Même? [39]
C.4:    Oui [40]

## Enumeration of sequences

First, a description is given of what actually happens in the interaction. The numbers in superscript designate successive acts in the transcription.
Second, the sequence is explained, indicated with the symbol: Ψ
→                                  next action/utterance or: leads to the following action/utterance
*italics* ↔ *italics:*          occurrences of simultaneity
NB:    The strategies are underlined

sequence: (1 - 2)

1. The adult introduces the task and asks the child indirectly to remember the previous encounters [1] → The child answers affirmative [2] → The adult explains the task [3] → The child gives an acknowledgement [4] → The adult continues the explanation of the task and instructs the child that she wants her to construct the village [5] → The child nods "yes" and answers "yes" [6+7]

Ψ    The child is asked to remember the previous encounters when the adult asks: do you remember that we've worked? The child says "yes" thus she remembers the previous encounters. The adult explains the task but does this not so extensive as in the pre-test. The reason for this could be that she thinks that the child incorporates experience in the previous encounters and hence already knows the script. The adult asks the child to construct the

same village on her cardboard plate. The child agrees with this by nodding and saying "yes".

sequence: (8 - 12)

1. The adult accepts the child's 'answer' and continues with the instruction $^{=8+9}$ → The child looks at the spot pointed by the adult $^{=10}$ → The adult says that the two girls standing by the lake have to see the houses at exactly the same spots $^{=11}$ → The child acknowledges $^{=12}$

Ψ   The communication develops smoothly. The child is attentive to the adult and the adult interprets the child's acknowledgements as continuers.

sequence: 13 - 31)

1. The child engages in the task and places the red house $^{=13+14+15}$ → The child gets up and determines with her fingers the distance between h1a and lake1, she then displaces h1c a little $^{=16+17}$ → The child takes the yellow house, looks at the model and places the house upon v1, she looks at the model again and displaces the yellow house a little $^{=18+19+20+21+22+23}$ → The child determines the distance between h1a and the edge of v2, she then displaces h2c a little $^{=24+25}$ → The child looks at the model and then displaces h2c a little $^{=26+27}$ → The child reaches at h3c and looks at the model $^{=28}$ → The child places the blue house upon v2 $^{=29}$ → The child looks at the model and displaces h3c $^{=31}$

Ψ   The child engages in the task. She knows the model is important because she looks at it regularly. The child's definition of the task is to place the houses as exactly as possible. She even uses her fingers to reach a state of perfection. She places the houses correctly.

sequence: 32 - 40)

1. The child hits with her hands on the table and looks briefly at the adult $^{=32}$ → The child corrects the position of h1c $^{=33}$ → The child makes a manual sign and utters something incomprehensible $^{=34+35}$ → The child looks up at the adult $^{=36}$→ The adult asks the child if she has finished and gets up to note $^{=37+38}$ → The adult asks: "the same"? $^{=39}$→ The child answers "yes" $^{=40}$

Ψ   The child has finished the task. She hits with her hands on the table to indicate this. After this she looks briefly at the adult. Then suddenly she corrects the position of a house. It looks as if she expects that the adult will ask her if the villages are exactly the same. If this is the case then the child not only has remembered the script of the pre-test but she has applied it to the post-test as well.

*In general: Both partners apply previous knowledge with the task, the situation and their roles in the post-test. The experimenter's instruction is very short, she directly asks the child to think of their previous encounters. This justifies the brief instruction in the post-test. The child has learned from the previous experience because she now shows no difficulties in entering into the experimenters expectations. She performs now better than in the pre-test.*

# Chapter 6: Discussion of the Results

The study of cognitive development in children has moved from a focus on the individual intellectual processes studied in relative isolation, as in the classic work of Piaget, to a concern of the 1970s and 1980s with social cognition, characterised by Vygotsky's views. More and more the environment or context is attributed a more active role in explaining cognition and development.

The concept of intersubjectivity (based on the joint construction of meaning, the negotiation of knowledge, common purposes and communication through symbols) fits in the socio-psychological approach to cognitive development.

In this chapter an overview is given of the findings of the secondary analyses. Besides this I will describe how the theories of Piaget and Vygotsky have comported to the so-called Cognition-Language Debate, which tries to determine the relationship between cognitive development and language acquisition. This debate is central to the theorising of the development of deaf children.

## 6.1. Problems in the Establishment of Intersubjectivity

In each interaction the way shared understanding is achieved depends on efforts of both partners. Although both adult and child are active in seeking intersubjectivity, differences in communication skill, general knowledge and especially knowledge related to the task should make it easier for the adult to adjust her attention to the interests and level of understanding of the child to achieve mutual comprehension. However the adult's role as an experimenter does not allow her to depart from her neutrality. So the child is confronted with the task to decipher the adult's intentions and to define the situation and the task. Moreover he is expected to do this even without using the aural channel to get information. This is a very laborious task and demands a lot of efforts on the part of the adult and the child. What specific problems, which are rooted in the child's hearing problems occur in these interactions and what problems do occur which are not an effect of hearing problems?

### 6.1.1. The Problem of Divided Attention

The attention of the child is a very important prerequisite for establishing intersubjectivity. A hearing child, however, can pay attention simultaneously to his activity and the instructions given by an adult. If a child is so deaf that he is unable to make sense of what people say without looking at them, then the child must employ the visual modality to monitor both the act and any object of communication. That is, when something is said to the child, he must look away from the object of communication to what is being communicated. This is called 'the problem of divided attention'. In the transcribed interactions we have seen that Mostly the adult experimenter commands the attention of the child by calling his name, knocking on the table etcetera. When she is certain that the attention of the child is focused on her, she starts to communicate the instruction. This is a good strategy. Several lines of research, however, find frequent dislocations of mutual understanding. For example, the hearing person may start to communicate before he or she has the child's full attention (Wood, et al, 1986; Swisher and Thompson, 1985). This makes learning through instruction more difficult for the deaf child.

### 6.1.2. Problems of Interpretation

Young children often don't show any evidence of knowing that spoken messages can be ambiguous (Wood, 1986). They do not distinguish between the actual message on the one hand and the speaker's intended meaning on the other. It will only be after the child is able to treat the message as a clue to the speaker's intended meaning and to evaluate it as adequate or not to that intention that he or she will be able to understand about ambiguity.

In our transcriptions we have seen many instances of misinterpretation. For example in the interaction with Julien, we have seen that the adult's question: "le même" is interpreted by the child as "which houses are the same". However, the adult's utterance is not explicit at all and the child fills in missing information which perfectly fits the situation. Even though this is an example of misinterpretation, seen however from the adult's point of view, the credit goes to the child who deals with the situation in a very creative way.

Much more serious problems of misunderstanding can be observed in the interaction with Sigrid. First, she does not seem to understand the meaning of an appealer (see [13, 15, 16]) An appealer serves as an explicit signal to the listener that some kind of feedback would be appropriate. However, prosodic aspects are very important to derive meaning from utterances which are ambiguous. The speaker's intention can in general be revealed from those aspects. For a deaf child to do this is nearly impossible and that might be the reason why Sigrid does not enter in the task, but instead answers the appealer. Another problem of misunderstanding occurs when Sigrid places the houses on the wrong cardboard plate. Throughout the interaction, nearly all the adult says is interpreted word-by-word. Even though research (Moeller et al, 1981) suggest that hearing-impaired children remain longer at the lexical stage of comprehension than normal-hearing children, you would not expect this heavy reliance on a key-word comprehension strategy in view of her age. These findings underscore the need to focus on language comprehension skills in the instructional programs of hearing-impaired children.

### 6.1.3. The Problem of Symbolic Play.

Some children of the secondary analyses showed marked difficulties when the experimenter mentioned to imagine a girl standing by the lake. Stefany, for example, seemed to search for this girl as she looked regularly to the spot where this girl was supposed to be. Symbolic or pretend play is thought to provide observable evidence of cognitive development as well as to be a mechanism through which cognitive growth can be proceed. Play development, like cognitive development in general, tends toward increasing ability to take various perspectives. The available literature consistently reports that something about deaf children's play differs from that of hearing children at similar ages. The specific difference is sometimes identified in the social realm (shown by excessive amounts of solitary play) and sometimes is the cognitive realm (shown by decreased use of object substitution or imaginary objects).

### 6.1.4. The Didactic Contract and the Experimental Contract

In chapter 5, a few times the term 'didactic contract' and 'experimental contract' is mentioned. An experimental contract regulates a situation in which an experimenter and a subject interact on a task, and a didactic contract regulates a situation between a teacher and a pupil interacting about a knowledge that has been taught. These two contracts differ on one important point: the didactic contract concerns an object of knowledge which is explicitly defined in the social and cultural project of the school institution, whereas the experimental contract refers to a culture specific to scientific research. According to the didactic contract, for example, the teacher is authorised to ask pupils to enter into the problematic of the task. Pupils do not doubt the relevance of the knowledge that is taught and know that they only will be questioned on issues that they have previously learned. The scholastic situation is familiar to the child and because of this the child can refer to some scripts. A testing situation is quite different. Few children are familiar enough with the research context to have constructed a representation of their role of experimental subject comparable to the representation of the pupil's role. Moreover, the adult's role is more difficult to understand for them and the objects of knowledge involved have not necessarily been previously taught in the classroom. In this situation, the child has to find his way without specific training for this peculiar relationship. What happens then, when a child is confronted with an unknown adult and faced with a strange task? How does the child make sense of this ambiguous situation? Only by importing their roles and knowledge from the school institution the child will be able to function in such a situation. Indeed, this happened

very frequently in the interactions transcribed in chapter 5. For example, we have seen several times that the child changes the position of the houses when the experimenter asked if the child has placed them according to the model. Obvious, the child interpreted this question as negative feedback in the sense of not having performed well. For the child, who has incorporated the only script he is familiar with: the didactic contract, it makes no sense that the adult asks the same question twice unless the construction of his village is not the same as the model. Another 'proof' of the child's active use of the didactic contract concerns the notion of the child's repeatedly looking up at the adult in order to receive feedback on his action. A typical exchange in the classroom consists of an *initiation* by the teacher, followed by a *response* from the pupil, followed by *feedback* to the pupil's response from the teacher. The teacher 'rewards' the child, gives positive feedback when his answer is good or negative feedback when his answer is not good, after which the teacher repeats the question in order to have it answered correctly by another child.

In sum, like hearing children, deaf children as well refer to their previous cultural and social experience to decide how to behave. Facing an unknown situation, they are likely to behave according to the contract they know best: the didactic contract.

## 6.2. The Cognition-Language Question

### 6.2.1. The influence of Piaget

The theory of Piaget has had a important impact on developmental psychology in general. Genetic Epistemology, the formal name of this theory, reflect its central point: the study of the genesis or origins in scientific thinking. European and American psychologists were inclined to study cognition as a set of internal processes, connected with brain functioning and to some extent, if not solely, biologically rooted. Piaget postulated that children's cognitive activities are general across problems, the specifics of a problem were not considered to have an effect on the cognitive activities. It was contradictory to his theory that some children do not use uniform reasoning on problems that are logically similar. However, there have been many demonstrations that the form of the problems does affect how children reason about them (see especially Donaldson, 1978, who demonstrates that when Piagetian problems make 'human sense,' they are clear to younger children). Furthermore, Piaget did not theorise about the role of the social world in helping the child to make sense of reality. Although Piaget speculated about the role of social factors and especially the role of peer interaction in middle childhood, the body of his research did not explore how the reality that children investigated has social structure or how children's interaction with peers can contribute to cognitive development. And the form of Piaget's theory that became popular in the United States, focused on the isolated child, learning general skills and strategies spontaneously. This emphasis on the individual has characterised decades of research in which children's intellectual milestones, memory strategies, and grammatical skills were studied. Starting before and along with the upheaval of Piaget's ideas, notably his stage-theory, psychometricians started to develop techniques and instruments for measuring and describing both general and specific aptitudes, leading eventually to the concept of IQ. Pintner (1923) acknowledged the pragmatic foundation of mental measurement and stated that intelligence testing "appeared as the fulfilment of a need that existed. It came to supply a want in society". Early research on deaf children's intellectual functioning routinely found it to lag behind that of hearing peers by several years. Pintner and others therefore developed non-verbal tests of intellectual ability expressly designed for the purpose of  better evaluating the mental abilities of deaf children. Such changes notwithstanding, deaf individuals still generally fared less well than their hearing age-mates. Many of those early tests however, were not appropriately standardised, and the investigators frequently used samples that were either biased or too small to be able to draw any strong conclusions. Unfortunately, these early findings have comported to a long history of explicit and implicit suggestions that deaf children are stupid as well as dumb. Piaget has also comported to the Cognition-Language Question. According to Piaget, cognitive development accounts for language acquisition. Therefore, deaf infants and

hearing infants may start out on equal footing, given a home environment with consistent, comprehensible linguistic input. Founded on Piaget's belief that language is part of a general framework of mental representational abilities, this position supports the notion that language emerges as a means of representing thought. Since cognitive development precedes linguistic understanding, it follows that it's the comprehension of language that is based on cognition. The Piagetian model of cognitive development contains some noticeable gaps. More research is needed to determine the interaction between factors of cognition and language acquisition in the preoperational deaf child.

### 6.2.2. The Influence of Vygotsky

Vygotsky's approach contrasts with Piaget's in its assumption that from the beginning the child is a social being, involved in social exchanges that guide the development of higher cognitive processes. Social guidance aids children in learning to communicate and to plan and remember deliberately from the first year of life. This guidance provides children with the opportunity to participate beyond their own abilities and to internalise activities practised socially, thus advancing their capabilities for problem solving. Vygotsky emphasised language as the most important tool of thought and stressed higher cognitive functions such as those promoted in school.

Linguistic input expands and regulates the expressive language of the child and, at the same time, suggest new ways in which he or she can view old concepts. This position is reflective of Vygotsky in that language is seen to have a great influence on thought. To Vygotsky, 'a thought unembodied in words remains a shadow.' A young child, for example, may, or may not, have predetermined communicative intent for an utterance. The caretakers, however, reacts to the utterance linguistically and, by doing so, suggests to the child that his/her action has meaning. Thus, Vygotsky saw thought and language as instruments for planning and carrying out action. Through language, the person comes to organise his or her perceptions and actions:

> Children solve practical tasks with the help of their speech, as well as with their eyes and hands. This unity of perception, speech and action...constitutes the central subject matter for any analysis of the origins of uniquely human forms of behaviour. (Vygotsky, 1978)

In addition to the emphasis on language, Vygotsky stresses that this process must also be seen in the context of the person's culture and the tools and aids which exist in that culture. Vygotsky's view highlights three points. First, *action* is the way in which the child responds to the world. Second, it is the process of 'turning round and reflecting on one's own thoughts', using *language*, that enables one to see things in a new way. Third, that learning is achieved through cooperation with important others on a whole variety of *social settings*.

With his emphasis on language as inextricably linked to thought or, to put it more strongly, to generate thought, Vygotsky has comported to the Cognition-Language Debate. Within his line of thinking, language influences cognition and cognition influences language to a degree that is more or less equal. Linguistic input expands and regulates the expressive language of the child and, at the same time, suggests new ways in which the child can view old concepts. Research findings that deaf children did not perform as well as hearing children on several tasks led to the conclusion that language was necessary for the development of truly flexible, internally mediated behaviour. These and other investigations corroborated theories equating intelligence and language with devastating effects on the self-esteem and self-respect of deaf people, as we have seen in chapter 3.

### 6.2.3. The Influence of Social-Cultural Research

A social-cultural approach to cognitive development considers it essential to view the cognitive activities of individuals within the cultural context in which their thinking is embedded. Within this view I have demonstrated that the concept of intersubjectivity can contribute to a reinterpretation of certain test-results of deaf children's capacities. A big part

of the early research forced the child to rely on verbal communication and by doing so, it took the risk of mixing up cognitive deficits with the child's incapability to understand what he was expected to do. Stated otherwise, if attempts to test deaf children's capacities subject them to language demands that they cannot meet, then any 'failure' on their part may not be manifestations of cognitive problems but merely the result of a failure to establish mutual understanding between the deaf child and the hearing experimenter. If one looks more closely at the processes by which an intersubjectivity gets constructed, test-results can be viewed at differently. One of these processes is the way the child interprets the situation. The notion of 'definition of the situation' accounts for the fact that the nature of the cognitive activity is determined not only by the external characteristics of a situation, but by the subject's interpretations of it. The definition participants attribute to the situation depends on their status and roles in the immediate context (micro-context), as well as in the social and institutional contexts (macro- and meso-contexts). In order to interpret a particular interaction situation, participants refer to their knowledge of other contexts. They do it more easily if the immediate conversational object can be linked to knowledge previously acquired in other contexts. The notion of 'communication contract' (Rommetveit, 1976) seems then particular relevant to describe the relationship between context-determined activity and intersubjective constructions. The term 'contract' points to the fact that any interaction situation is based on a system of norm and values, as well as on explicit and implicit rules playing an integral part in the construction of a definition of the situation and the task. Several studies have addressed the issue of the relationship between the children's cognitive activity and the characteristics of the contract (Edwards & Mercer, 1987; Säljö, 1991). These investigations have shown that the children's cognitive activity is linked to the abilities they have acquired in different contexts and to the interpretation of the situation and of the task they construct in the interaction.

# Chapter 7: General Conclusion

## 7.1. Comparison between Pre-test and Post-test

In chapter 4, I have formulated the following hypothesis: "during the pre-test, the experimenter and the child are seen in more different behaviours to establish a mutual understanding of the task than in the post-test. Cognitive and social behaviours will be different in pre- and post-test". Along the way it turned out to be very difficult to compare the pre- and post-test. Both tests are different from one another. In the analyses of the interactions it can be observed that during the post-test the child refers to previous experience and incorporates this in the post-test. It is likely that the child reconsiders his behaviour because of the repetitive nature of the situation. The same applies to the experimenter. Just like the child, she actively refers to previous experience with the child in the pre-test and interaction phase. This can be inferred from two observations. The first observation is that the formulation of the instruction in the post-test is shorter than in the pre-test. The second observation concerns the experimenter's behaviour. Her behaviour is less intrusive in the post-test than in the pre-test. In the pre-test she felt the need to intervene and correct the child immediately when the latter showed instances of discontinuous attention. In the post-test, however, the experimenter permits the child to have moments of discontinuous attention without correcting this. She also allows the child to enter into the task before she has finished the instruction.

This makes the post-test in itself a different test in which cognitive and social behaviours cannot be separated. The total test-situation (that is: pre-test, interaction phase and post-test) can be seen as a double-sided cognitive and social process concerned both with the transmission of previous experience and the emergence of new ideas

## 7.2. Concluding Remark

One of the purposes of this paper was to make a connection between former theories of children's cognitive development, research carried out according to these prevailing theories and the implications these 'outcomes' have had in political policies and some societal arrangements, especially institutions such as formal schooling. These inextricable links have been demonstrated very clearly in the history of deaf people, their education and the way they have been viewed at. Both theories of Piaget and Vygotsky have been described to elucidate these points and to build a bridge to the study of cognition and cognitive development in a sociocultural context.

Within psycho-social research in general, it is found that the child's responses on psychological tests are not a direct expression of the ability on which he's tested. His responses are the result of the construction of an intersubjectivity between himself and the experimenter. This joint understanding relies on cognitive as well as social skills and gets constructed within the present interaction between the partners (Schubauer-Leoni, Perret-Clermont & Grossen, 1992).

It has been argued that, given their restrictive conversational experience, deaf children are at risk of having more difficulties in entering into intersubjectivity than hearing children (Stewart, Akamatsu & Bonkowski, 1988). In this perspective I have suggested that weak test-performances of deaf children are not necessarily an indication of cognitive failure, but of difficulties of both partners in establishing intersubjectivity. The present study (the secondary analyses) were aimed at describing how intersubjectivity gets constructed and which problems occur in this construction. Detailed analyses of several video-recorded interactions between an experimenter and a deaf child in a test-situation have indicated

among others that problems of divided attention, ambiguity of formulations and cultural concepts can hamper intersubjectivity and hence decrease the reliability of test-results.

## 7.3. Recommendation for Further Research

The major implication from the secondary analysis is that test-results of deaf children's cognitive capacities cannot be interpreted validly without looking closely at the interaction between the child and the experimenter. That what happens in the interaction can eventually explain the outcomes of the test. Therefore it is necessary to analyse such interactions in order to become aware of the effect of previous experience gained in 'similar' situations and to explore the experimenter's role in it.

Grossen (1988) has investigated the role of previous experience in a test-situation by inviting subjects to role-play the experimenter. It was found that children of different cognitive levels understand the adult's behaviour differently. This leads them to different strategies to establish an intersubjectivity with the experimenter, which, in turn has different impacts on their cognitive performances. It would be interesting to explore this in deaf children.

When research is proceeded to study the contribution of hearing adults to the deaf child's experience, it will be possible to understand their cognitive development better and to understand the role hearing adults play in its formation.

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