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The kaleidoscope of communication
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Different perspectives on communication involving children with severe multiple disabilities

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Abstract

This thesis consists of six publications presenting a theoretical framework, a methodological proposal and three empirical studies. The theoretical papers address aspects on communication and disabilities more in general, while the empirical studies are focused on pre-school children with intellectual disabilities in combination with vision disability and/or motor disability.

The aim of the work is; to gain knowledge on how the children communicate with their caregivers, to analyse how different research strategies can add knowledge from different perspectives on communication, and to develop models for analysing and describing the dyadic interaction.

The theoretical framework deals with the impact of multiple disabilities on the child’s communicative development, as well as the role of the communication partner, and implications for interventions. In the methodological framework different research approaches are discussed and a system theory based approach is proposed. The empirical studies investigate the relationships between use of communication and child characteristics and setting conditions by combining a variable-focused research design with a person-centred design and then testing the proposed system theory-based approach on two cases of dyadic interaction between child and caregiver.

There was a pattern of relationships on group level between type and severity of disability and use of communicative functions but there were individual patterns that differed from the group results. It was also revealed that the use of different communicative functions had stronger relationships with setting characteristics than with child characteristics. In the communication process it was found that the child and caregiver continuously co-regulated their actions and together created consensual frames. The process went through qualitatively different phases that could be regarded as phases of instability and stability. Within a system theory framework analysis, models are presented of; the hierarchical order of consensual frames, the dynamic process of the dyadic interaction and the phases in the process.

The discussion is concentrated around how the results from the studies along with the theoretical aspects can contribute to evidence-based practice. The main conclusions are that, in communication involving a person with severe multiple disabilities, meaning is something that is co-constructed and communication cannot be regarded as a personal competence, the competence is within the dyad.

Key words: dyadic interaction, pre-symbolic communication, multiple disabilities, system theory, communication process, communication models
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The thesis is centred around six publications, which will be referred to by Roman numerals I – VI.


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* The Journal’s web site: [http://www.tandf.co.uk/journals](http://www.tandf.co.uk/journals)
Communication research, or any research within a given field, is like a kaleidoscope. Shake it and shake it once again, and you will get different patterns although it still consists of the same pieces of glass in constant shapes and colours that form new patterns. This thesis provides a multifaceted picture of dyadic communication involving children with severe multiple disabilities. From the starting point of patterning the relationships between disabilities and communicative skills on individuals, the picture turned to a system theory oriented mapping of patterns in dyadic interaction between the child with severe multiple disabilities and the caregiver.

The concept severe multiple disabilities refers to a primary diagnosis of intellectual disabilities (moderate to profound\(^1\)) and one or more additional disabilities in combinations that severely affect daily life and, not least, the communication of a person. The vocabulary describing these individuals varies between countries and as a necessary adaptation to the publishers and journals where the papers in this thesis are published, the persons in the papers are also referred to as persons with (severe to profound) learning disabilities or as pre-symbolic communicators. The three theoretical papers address more general aspects of communication as affected by a person’s intellectual or multiple disabilities, without specifying age of the person or kind of disabilities. In the three empirical studies the subjects are preschool children with intellectual disabilities in combination with vision disability and/or motor disability. Some of the children have disabilities that could be referred to as profound, but to facilitate comprehension in the general discussions the concept severe multiple disabilities is used.

Dyadic interaction with children with severe multiple disabilities faces many challenges as it does not follow the intuitively known “map” of how to communicate. These children do not use, or have a very limited use of, speech or other conventional symbols. Rather they communicate through body language, facial expressions, eye gaze and manual gestures that are not always in accordance with expressions used by the typically developing pre-symbolic child. Throughout the day, parents, assistants and school staff have to make assumptions about the child’s likes, dislikes and feelings as

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\(^1\) According to definitions by WHO (World Health Organization, 1980) the degree of intellectual disability is classified as corresponding to the following intelligence quotient (IQ): profound – IQ below 20, severe – IQ 20-35, moderate – IQ 35-50, mild – IQ 50-70.
well as assumptions about the validity of their own interpretations. As typically developing children progress towards more complex forms it becomes easier to know what to expect from the child and the developmental milestones are well-known and predictable. Children with severe multiple disabilities also progress in their development, but due to physical or intellectual restraints, their development of new skills may not fit into the map of typical development. Even with the help of assistive technology and communication aids they will most probably have a limited range of conventional expressions and their use of them will not be comparable with the normal use of spoken language. Thus, as stated in publication VI in this thesis and also by Wilder and Granlund (2003), in dyadic interaction with a person with severe multiple disabilities the communicative outcome cannot be valued from the use of more complex skills but rather from the communication partner’s experience of a mutually rewarding interaction.

Background

Before the beginning of the 1990’s, what today is referred to as communication for persons with severe multiple disabilities, was not labelled as communication by many researchers and professionals but merely as a kind of social interaction. In this thesis, I will further elaborate on the interaction concept and also present and discuss different definitions of the concept “communication” and the implication of different views on communication. The thesis will reflect the shifts of focus within this area. To cover the broader area of research, the following review of different perspectives will not focus solely on research on persons with severe multiple disabilities but more in general on persons with disabilities. Changes in the conceptual relationships between “communication” and “persons with disabilities” can be expressed quite simply by using different prepositions; in, with and between. These reflect changes in attitudes and thus changes in research perspectives. There have been changes that at certain times even could be regarded as a paradigm shift. These shifts do not mean that former perspectives must be totally abandoned but rather that they are merged with new perspectives and thus the knowledge of communication involving persons with disabilities is broadened. There is a need to summarise previous knowledge in order to make new “maps”. As shown in Figure 1, three different approaches can be discerned. They are Communicative skills in persons with disabilities, Communicating with persons with disabilities and Communication between persons with disabilities and others.
Figure 1. An overview of research questions, research perspectives and publications.
Figure 1 is a flow chart showing my own research interests over time, how different approaches have emerged from different research questions and how new questions have been raised over time. It also gives an overview of my publications, which represent different perspectives, although only a few (the ones that are in bold in Figure 1) are part of this thesis. Three of the publications in the thesis can be regarded as overlapping between research perspectives.

**Communicative skills in persons with disabilities: A person characteristics approach**

First there was the “person characteristics” approach. The communicative ability was regarded as something inherent in the person and, as a consequence, assessments as well as interventions focused on the person with disabilities. The research question was then: What individual characteristics related to type and severity of disability, affect the use of communicative skills? To address this question, prerequisites for communication and communicative use among persons with intellectual disabilities as well as among persons with additional motor, vision and hearing disabilities were assessed by interviews and structured observations (Granlund & Olsson, 1993; Granlund, Olsson & Karlan, 1991). This gave useful knowledge about how different personal skills were interacting with, and affected the use of communicative form and function. The topic was further investigated in the first empirical study in this thesis (publication I).

In one of the studies that aimed at validating the two kinds of information that were used, interview data and observational data, the impact of the partner on the information attained was revealed (Granlund & Olsson, 1993). When it was the same individual that was interviewed about the communicative skills of a person with disabilities as was then observed in interaction with that person, the correspondence between the two kinds of assessments was stronger than when there were different persons interviewed and observed as partners. The result indicates that the communicative competence, that is functional communication to meet daily communication needs in a natural environment (Light, 1989), is a product of both persons involved in the communicative process. Although the physical and social environment was also taken into account in the assessments in the early studies and constituted a part of the investigation, it was, at that time, somewhat subordinated to the focus on person characteristics. However, questions were raised about the impact of the physical environment and of the communication partner.
Communicating with persons with disabilities: A person-environment approach

The focus on the person with disabilities was followed by the “environmental” approach, focusing on the setting and/or the partner. With focus on the setting, the former assessment of individual characteristics was repeated in a study of nine children with multiple but varying kinds and degrees of intellectual, motor and vision disabilities, but this time also investigating the use of communication in two different settings (publication I). The results showed that the setting had a similar impact on all the children who consequently displayed one pattern of interaction in one setting and another pattern in the other setting. On the other hand, two children with similar levels and types of disabilities could differ quite a lot in their use of communicative skills, and children with different disabilities could demonstrate similar use of communicative skills.

With a focus on the communicative partner and the social environment I, together with colleagues, conducted a series of studies on the effects of staff in-service training and collaborative problem solving, all with the aim of implementing intervention objectives and strategies in the everyday environment of persons with severe to profound intellectual disabilities (Björck-Åkesson, Granlund & Olsson, 1996; Granlund, Björck-Åkesson, Brodin & Olsson, 1995; Granlund, Björck-Åkesson, Olsson, & Rydeman, 2001; Granlund, Olsson, Andersson & von Dardel, 1990; Granlund, Steenson, Sundin & Olsson, 1992; Granlund, Terneby & Olsson, 1992a, 1992b). The implementation of different strategies was evaluated for evidence of change (Granlund & Olsson, 1999). None of the studies with a focus on the partner and partner strategies are a part of the thesis but have had an impact on my view of the importance of the communicative partner for the interaction outcome.

To get a meaningful interaction with a pre-symbolic communicator, the communicative partner has to make a lot of adjustments in his/her ways to communicate and also make inferences from a lot of sources like environmental cues and personal experiences. This is the focus of publication II in this thesis. A viewpoint that communication is a product of both partners’ actions within the communication process raised a new question: What is really going on when two persons communicate?
Communication between persons with disabilities and others: A process approach

The next step was then to study the communicative interaction as a phenomenon in itself. The target group was still persons with severe and multiple disabilities, and both interacting partners as well as the setting in which communication occurs were still of interest, but now the focus was moved to the process of communication. I experienced that it is not only my own view on communication that has changed from a focus on specific variables to a focus on the process, but also that there has been a tendency towards more process oriented research in communication in recent years. With a focus on processes, the questions are raised about how the process could be studied and how the findings could be presented. For that purpose I applied the system theory approach that is presented in publication III.

There was also another aspect of importance. So far, research on disabilities had mostly dealt with questions about how persons with disabilities deviated from the reference norm of normal development and how interventions could enhance “normal” patterns of communication. My own experiences in research and clinical work, as well as the work of other researchers (McCollum & Hemmeter, 1997) and statements from professionals and parents, indicated that many times the interaction between a person with disabilities and significant other persons could be quite efficient in spite of, or more often as a consequence of the partners’ individual and very unique strategies to come to an understanding of each other. Maybe it is not the “degree of normality” in how persons are communicating that is the desired outcome but rather what the partners obtain in their communication. The question to be addressed was then: What are the unique strategies used in a unique dyad to get a mutually rewarding interaction?

In communication research in general and in research of communication and disabilities, dyadic interaction has been a focus of many studies to yield information especially about turn-taking. With the aim of finding out more about what was happening in the process of dyadic interaction I conducted two studies of communication between caregiver and child using a system theory approach, presented in publication IV and V. The findings from those studies showed that interaction strategies can be regarded as flexible processes and that there are many ways to obtain a mutually rewarding interaction. The use of a system-oriented model to analyse early interaction patterns between a child with multiple disabilities and the caregiver highlights which elements and relationships between elements are involved in the process. It might help to understand how and at which points in the process, interventions can best be introduced. A conclusion is
that interventions concerning interaction between persons with severe disabilities and their partners must be focused on the dyad and must be personalized depending on the perceived needs of the individuals involved. This is also what is emphasised in the last discussion article in this thesis, publication VI.

**Different research questions yield different research strategies**

It is obvious that different research questions must be met by different research strategies and that they are all needed to obtain a comprehensive view of communication and disability. In research on communication and disabilities, both qualitative and quantitative research strategies are used, although with a predominance on the latter. Even though the prevalence of qualitative narrative case studies has increased, a quantitative variable-based approach, using traditional statistical methods to explore relationships, still seems to be the most commonly used research design.

Among the publications that are enclosed in this thesis there are three empirical studies representing two different research strategies. The study presented in publication I is chosen to present the traditional variable based approach, although it also represents an overarching research approach, proposed by Light (1999) to combine information about how variables are related to each other with information about variable patterns in individual cases. The presentation of results also builds on a combination of quantitative and qualitative information. The last step in this study and the detailed investigation of single individuals, elicited a shift to another kind of data analysis approach and presentation of findings, a more narrative person-pattern approach that was used in the studies presented in publication IV and V. The shift from studying relationships between specific variables to studying processes for individuals also led to a need for other research designs. To address the question about what was going on in a process, of which I had no preconceived assumptions, I had to abandon the deductive approach and choose an inductive qualitative approach. The focus on processes also led to the application of a dynamic system theory framework.

**Disposition**

The selection of publications for my thesis is made to reflect a variety of perspectives on how children with severe multiple disabilities are communicating in interaction with caregivers. The empirical studies are mainly presented in the method and result sections, while the more theoretical pa-
pers constitute parts of the framework of the thesis that link the empirical studies together. The publications are of varying format, three are articles, published in peer-reviewed journals (publication I, II and IV), two are published conference proceedings (publication III and V) and one is a chapter in an edited book (publication VI).

As the first study, presented in publication I, investigates the relationships between individual variables and communicative variables, as well as between individual variables and environmental variables, it will represent the two first perspectives; a person characteristics approach and a person-environment approach. The person-environment approach is then further elaborated on in the discussion article in publication II with a focus on the child with disabilities as well as on the communication partner. The third perspective, the process approach, is introduced as a theoretical article in publication III. This publication presents the theoretical framework of system theory, which is then applied on the two empirical studies in publication IV and V, presenting two different ways of using system theory. The third perspective is considered to be the newest approach, least used and developed in research on communication and disabilities so far. Therefore, this approach has been given the most space, represented by three publications. As publication V is a conference proceeding the presentation of the third study is less detailed. However, the second and the third studies are part of the same project and thus share initial theoretical and methodological considerations. Consequently they will be treated together in the method and the result sections. This thesis does not include any intervention study but because interventions should be a final outcome of research findings, publication VI, that is a theoretical discussion paper about interventions, will be utilised as a framework for the final discussion. Table 1 gives an overview of the different chapters and of their content.
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**TABLE 1. An overview of the chapters and content**
Aim of the thesis

Communication and severe multiple disabilities can be regarded from many different perspectives. The focus can be on the person, on the environment and on the communication process. Depending on the focus there are different research strategies and models for analysis. This thesis will put together a multifaceted view on communication in order to supplement previous knowledge with new “maps” for how to obtain a mutually rewarding interaction between child and caregiver. The aim of the thesis is:

1. To gain knowledge on how children with severe multiple disabilities are communicating in interaction with their caregivers.
2. To analyse how different research strategies and methods can add knowledge from different perspectives on communication.
3. To develop models for analysing and describing the process of dyadic interaction involving a child with severe multiple disabilities.
Summary of the publications

Publication I (empirical study): *The use of communicative functions among pre-school children with multiple disabilities in two different setting conditions: Group versus individual patterns*

Previous research has indicated that the use of different communicative functions is related to cognitive skills, use of senses, and motor skills. There have also been suggestions that the type of setting, in which the individual acts, influences the communicative interaction. The main purpose of this study was to find out to what extent the frequency of use of different communicative functions among children with severe multiple disabilities was related to individual specific characteristics and to what extent it was related to environmental setting characteristics. A second aim was to utilize a combined group and individual analysis approach to find out if the communication patterns evident in group results were representative of those of the individual members of the group and also to find out if an in-depth description and comparison across individual cases could provide clinically relevant information.

Nine children, (age 2-6 years old), with moderate to profound intellectual disabilities and additional visual and/or motor disabilities were video recorded at pre-school in interaction with pre-school staff in two play settings. One setting was set up for manipulating toys and the other was set up for mobility to reach toys and play activity. The children’s functional use of cognitive, visual, manipulation and mobility skills in everyday activities, as revealed by structured interviews with the pre-school staff, was correlated with the observed rate of use of the communicative functions; behaviour regulation, social interaction and joint attention. The two setting conditions were also compared with regard to use of communicative functions.

The first analysis on a group level showed that individual-specific characteristics were correlated with rate of use of communicative functions and that those relationships varied across the two settings. In the mobility setting there was a significant positive correlation between the rate of joint attention and cognitive skills, as well as vision skills, and between rate of behaviour regulation and vision. In the manipulation setting condition there was a significant positive correlation between rate of behaviour regulation and cognition. When the relationships between setting conditions and use of communicative functions were investigated it was revealed that joint...
attention was the function used most in both setting conditions. The manipulation setting was the setting with the largest proportion of joint attention, and the mobility setting was the setting with the largest proportion of social interaction. Both setting conditions contained the same amount of behaviour regulation.

At the second step of analysis, the proportions of participants whose results were either congruent with or differ from the group results, were examined. It showed that six of the nine children followed the group pattern of relationship between individual-specific characteristics and rate of use of communicative functions. But in three out of the four significant correlations, one to two of the children deviated from the group pattern. The analysis also showed that the relationship between setting condition and use of communicative function was valid for all of the children. Every child followed the group pattern and had more social interaction in the mobility condition than in the manipulation condition, and more of joint attention in the manipulation setting condition compared to in the mobility setting condition.

In the third step of analysis, three children, one who was typical for the group pattern and two who were not typical, were selected for a more detailed description. Ian and Helen were selected on the basis that they had similar and very severe disabilities but differed in their rate of communication. Ian followed the group pattern in all aspects and had a very low rate of communication per minute in both settings while Helen deviated from the group pattern and had a higher rate of communication than could be expected from her severe disabilities. Bibbi, the third child, deviated from the group pattern in another direction. Compared to Ian and Helen, she was functioning at a higher level of cognition, had good use of vision, and less severe motor disabilities but did not have a high rate of communication.

In summary, the results showed that the relationships between the rate of use of communicative functions and individual-specific characteristics proved to be weaker than those between rate of use of communicative functions and setting characteristics, which proved to be very strong. The results also revealed that children with similar individual characteristics could display quite different rates as well as different patterns of use of communicative functions. In addition, the three levels of analysis indicated that group results may be clinically more useful if validated by close inspection of individual patterns and the qualitative information obtained through case studies of participants.
Publication II (theoretical article): *See what I mean: Interpreting the meaning of communication by people with severe and profound intellectual disabilities*

Persons with severe disabilities are often unable to use, or have very limited use of, spoken, signed or graphic linguistic codes and this causes an ambiguity of how to interpret their signals. It increases the dependence of familiar communication partners both for dyadic communication and to act as advocates, facilitators or interpreters to other less familiar partners. As such, they have to rely a great deal on their own judgement about the meaning of the behaviours and this may raise the question: Whose message is it?

This article discusses theoretical issues associated with interpretation of the meaning and the development of guidelines to support a process of validation. Two different models of communicative interaction are compared, the information process and the continuous process. While the information process model assumes that meaning is inherent in particular behaviours or signals produced by individuals, the continuous process model suggests that the stages of the process are much less discrete, and that both participants are continuously active, modifying and responding to each other’s behaviours. These two different models are linked together by Theory of Relevance, which proposes that every act of communication involves two dimensions. One is the linguistic encoding and decoding, the other is inference, whereby communicative intentions and meaning are manifested and interpreted in relation to the participants’ knowledge and assumptions and in relation to the context. As the amount of explicitly encoded information goes down, the level of inference must increase. In interactions with people who have limited abilities to express themselves through a formal linguistic code, the balance will nearly always be weighted towards inference.

The process of interpreting communication involves two kinds of inference: inference regarding the meaning of the message and inference regarding the intentional state of the person who is interpreted. In the article, it is stated that the intentional state cannot be dichotomised as intended or unintended because every behaviour comes with some kind of intent. It is rather a question of the person’s conscious awareness of his or her own intentions. It is possible to distinguish four levels of progressing awareness of one’s own intentions: i) unawareness of any intent, that is when the body as a system is reacting without the person being able to plan the effect of the behaviour, ii) goal-intentional awareness, when the person is aware that the behaviour can be directed to a specific goal, an object or another person, in order to produce an effect, iii) means-intentional awareness, which means
that a person is aware of the possibilities of achieving a goal through the
use of a tool, iv) partner-intentional awareness, which means that the part-
ner is seen as a subject with his or her own desires and intentions that can
be affected. Intentions can exist at multiple levels of consciousness, multi-
ple intentions can co-exist in an act of communication, and intention and
consciousness can change during the process of interaction. In the case of
people with intellectual, sensory and motor impairments, signals of intent
can be highly individual and non-conventional and although we may as-
cribe a meaning to behaviours, we may never be certain of the kind of in-
tent that is present.

A review of communication development suggests that at very early
stages of communication, caregivers will be likely to rely more on infer-
ence and intuition, and have less access to reliable evidence than at later
stages of more complex communication. If a person has difficulties to ex-
press a clear meaning and intent, there is often a conscious or structured
over-interpretation, which implies a reflective and analytic stance on the
part of the interactive partner but the authorship of the message may be cal-
led into question.

The conclusion is that there is a need for an evidence base, which may
be used to validate, or check out, interpretations. As a useful starting point
a constructionist perspective approach that fits with a concept of construc-
tion of meaning as reciprocal and dynamic, rather than discrete and static,
is proposed. It should encompass documentation of the actions of the com-
municative partner in order to plot the extent to which an interpretation is
supported by cues and prompts, and observation of how meanings may
change when aspects of supportive context vary. A systematic collection of
evidence across naturalistic settings and over time will allow us to be clear
about the extent to which our interpretations can be validated through other
sources of information and where they cannot.

Publication III (theoretical proceeding): *A system theory approach on dy-
adical interaction*

This paper was presented at a research symposium as a part of a section on
theoretical models and their relevance for augmentative and alternative
communication (AAC). The purpose of this presentation was to discuss
how system theory could be implemented as a scientific approach to AAC.

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2 Augmentative and alternative communication (AAC) is used as a term to signify use of
different means of communication other than speech as an augmentative or alternative
mode of communication due to different kinds of disabilities.
Augmentative and alternative communication is a multidisciplinary phenomenon and thus related to a variety of scientific fields and theories, as for example, sociology, linguistics and psychology. System theory can be viewed as a meta-theory that can encompass or be linked to other theoretical frameworks. From a general system theory point of view, the concept system can be applied to any entity that consists of interactive elements. Thus communication can be regarded as a system and the communicative process more specifically as a dynamic process system, that is, a continuously changing process moving in a certain direction. It is suggested that application of a dynamic system approach would add knowledge to the field of AAC, especially within the area of early communication development and pre-symbolic communication. The relevance of system theory as a theoretical framework for this area is built on three key principles. First, communication is defined as something that occurs when a person assigns a meaning and responds to a behaviour from another person. This is closely linked to the second principle, that humans are intentional and that each behaviour from a person can be treated as having a communicative potential. The third principle is the principle of equifinality, which means that different processes can lead to similar system organisations, that is, there are many ways to obtain a meaningful communicative interaction.

When examining the main features of system theory in general, and of dynamic process systems specifically, these features are easily applicable to the field of AAC. Communication as a system can be more or less open to influences from other systems. A formalised and rule governed communication, such as conventional or spoken language, is a less open system, while AAC, in most cases, and especially pre-symbolic communication can be regarded as more open systems. In an open system there are many different ways to obtain a communication goal but the lack of linguistic rules also puts certain demands on the partners to adapt to each other. There are shifts in the system between stability and instability when elements or relationships between elements change as they do in a process. A model is presented showing communication as a continuous process system containing two important concepts, co-regulation and consensual frames that can be well applied to the use of augmentative and alternative communication systems as well as to pre-symbolic communication. These concepts describe how the communicative partners change their actions with respect to the ongoing or anticipated actions of the other and how they negotiate in order to come to a consensus about the meaning or the topic of the interaction.

As a summary of the research seminar it was concluded that dynamic system theory could serve as a theoretical framework to better understand
the communicative process for persons using augmentative and alternative communication. However, to make the theory really useful, there is a need to derive models from the theory, models that can be guided by the following research questions: Can dynamic system theory be used in research, not only as a theoretical framework to explain certain research findings but also as a methodological framework? How relevant are findings of process characteristics of one dyad for the understanding of the process within another dyad? And finally, will a dynamic system theory-based approach change something or add something new to communication intervention programs?

Publication IV (empirical study): *Dyadic interaction with a child with multiple disabilities – a system theory perspective on communication*

An assumption for this study was that a mutually rewarding communicative interaction with a child whose development is atypical presents unique challenges that have to be met through the implementation of unique strategies by both partners in a dyad. The aim of this study was to provide a description, interpretation and model for communicative interaction in a particular dyad consisting of a child with severe multiple disabilities functioning at a pre-symbolic level and his caregiver. A qualitative, inductive approach focused on process analysis was used to examine a videotaped play interaction between a six-year old boy with severe multiple disabilities (intellectual, visual and motor disabilities) and his caregiver in a ten minute play session with a toy piano at pre-school.

System theory was used as a theoretical and conceptual framework to analyse the communicative process. Co-regulation, consensual frames and system dynamics were key concepts used to examine how the behaviours of the child and the behaviours of the adult were related to each other and how the partners co-created meaning in their interaction. Co-regulation means that the partners continuously alter their actions with respect to the ongoing and anticipated actions of the other. Co-regulative adjustment was noted as immediate reactions to what the partner did, as well as a prolonged change of activity over time. Consensual frames, which indicate a mutual agreement about the topic, were noted whenever there was such congruence between the behaviours of the child and those of the adult to allow a shared focus to be assumed. The creation of meaning formed different topics with some topics seeming to be hierarchically ordered, while others could be regarded as sidetracks from the main theme, the toy piano. The concept system dynamics was used to show how the actions from each partner were embedded in dynamic transaction with the other in such a way
that none of the partners had complete control over either the process and structure, or the outcome of communication.

As a result of the analysis, two models are presented. The first is a model of how a hierarchical order of consensual frames is built. As the hierarchical order of consensual frames indicated, the communicative interaction between this child and his caregiver could be viewed as a process of searching for meaning and for increased specificity of what they communicated about. The second model provides an illustration of the communication dynamics and is a process map that displays the frames as links in a chain. A chain consisted of different frames, interruptions to other frames or no frame at all until the core frame, listen to the piano, was reached. When the piano was played, the child and his caregiver had reached a goal for their piano activity, which was considered the end of the chain. They then started the process again and built a new chain. The whole ten minute session consisted of four such chains.

It is suggested that a system theory approach could be a useful framework, not only to explain results, but also as an analytical tool to provide more dyad-specific interaction models as a basis for individualized interventions. Furthermore, it is suggested that a dynamic system approach to communicative interaction with non-symbolic persons may help to identify the co-construction of meaning as a social and mutually rewarding process in itself.

Publication V (empirical study): Interaction between child and caregiver as a dynamic system

The purpose of this study was to demonstrate the use of a system theory-based approach in studying, analysing and describing dyadic interaction with a child with severe multiple disabilities. The videotaped communicative interaction between a three-year old girl with severe multiple disabilities (intellectual, visual and motor disabilities) and her caregiver in a ten minute play session at the pre-school was observed and analysed. Concepts from system theory were transformed into methods of data treatment and data analysis as well as used to present and explain results.

The interaction between child and caregiver was regarded as a system, with the system defined by its task. The task specification means that when parts of the system are organised and reorganised it is still in a certain direction. In this case, the task was “the dyadic interaction in the play session”. A play interaction system is an open and dynamic system, which means that it is a continuously changing process. Examining a system
means to analyse the nature of its component elements and the relations or “forces” between them. There are elements or sets of elements that have more influence than others and serve to keep the system oriented towards its task, but at critical points or times, changes occur as a result of changes of the elements or relationships between them. Stability is then lost during the transition from one phase of stability to another. The analysis consisted of examining what kind of elements were part of the process (behaviours, objects, events outside the dyad etc.), at what point new elements were introduced, and changes in relationships between the elements. The main task for the analysis of the interaction in the play session was to reveal the relationships between behaviours and how these are organised to achieve the play interaction, how the system was changing, what caused the changes, and the effect of the changes on the system.

The examination resulted in the findings of qualitatively different phases in the process of interaction. The nature of a phase and its demarcation from other phases was tested by analysing what had caused the change at a certain point and what served to provide a new stability. Eight different phases were discernible, with durations from about 20 seconds to more than one minute. Attractors are sets of elements and the relation between them that serve the function of keeping the system moving on in a certain direction. The following attractors, were found: 1) the partners interest for and manipulation with the toys (e.g. looking at, taking, handling, offering, requesting) 2) the partners interest for each other and mutuality in the play (e.g. turning to, looking at, touching, use of breaks for turn-taking, 3) the quality of the toys (e.g. possible to hide, to make a sound with when hidden etc.) and the type of play (to get hold of for sole play or hide-and-seek in shared play, hidden so there is a need for help). A control parameter is an element acting as the primary agent for a transition into another phase. Many of the control parameters found were elements that had not been in the system before, but when they entered they caused a change, e.g. the caregivers move to the other side of the child or a new place to hide the toy.

Conclusions from this study are that the use of a system-oriented model to analyse early interaction patterns between a child with multiple disabilities and the caregiver illuminates the elements and the relationships between elements that are involved in the process. It might help to understand how and at what times in the process interventions can best be introduced.
Publication VI (theoretical book chapter): *Presymbolic communication intervention*

This chapter is one of several in a book about evidence-based practices (EBP). EBP means that current research evidence, clinical/educational expertise and stakeholder perspectives are integrated in order to facilitate decisions for effective and efficient assessment and intervention for a given direct stakeholder. This special chapter in the book focuses on efficacy research with persons who are functioning at a pre-symbolic level, due to multiple or severe disabilities. Information on EBP for pre-symbolic communicators is characterized by a limited number of intervention studies so far. The preliminary conclusions drawn from reviewed studies can serve as a framework for future research and implementations in practice. The chapter is structured around three questions. First, what is good intervention outcome for persons who interact at a pre-symbolic level? Second, how are decisions made about what outcomes to prioritize in intervention? Third, what methods used in communication intervention are focused on interaction between pre-symbolic communicators and their partners?

The first question about good intervention outcome is addressed by a discussion about the goals for intervention with pre-symbolic communicators and if those goals can be related to general theories about communication. An analysis of different concepts, definitions and perspectives on interaction and communication is made to assist in recognizing the theoretical framework on which we build assumptions about desired outcomes and best intervention. For example, if formal criteria of intentional communication, taken from the behaviour repertoire of normally developing persons, are used to define an interaction as communicative, a great proportion of the actual interaction between pre-symbolic communicators and their partners will be excluded. The absence of evidence for intentions cannot in itself be taken as a proof for lack of intent by atypically developing persons. A main critique from the authors is that typical development has been used as a norm and to set guidelines even in cases involving persons who are not typically developing. It is questioned if what is known about parent-infant interaction with normally developing children also can be applicable to desired outcome of intervention when the person has profound disabilities. The authors argue that the desired outcome of intervention for pre-symbolic communicators is a mutually rewarding interaction with communication partners rather than the development of more complex communication skills, per se. It is suggested that interventions should focus on the participation in social relationships and interpersonal interaction rather than on
the individual’s performance of activities and communicative skills, which means that the traditional focus on assessments and interventions on the interaction skills of the partners should be replaced by a focus on the communicative process. The traditional linear model of communication as consisting of discrete units; a message that is coded and transmitted to a receiver who decodes it and responds to it, is contrasted with a continuous process model where both partners adapt to each other and mutually co-regulate their behaviours. With this latter perspective, the communicative competence or lack of competence cannot be related to one of the partners, rather it is within the dyad and can be associated with a mutually rewarding interaction as an intervention target. Thus the continuous process model is proposed as a framework although there is, at present, no research available based on this model to support EBP.

The second question about which outcomes to prioritize in intervention is discussed in terms of stakeholder perspective, intervention process, assessment instruments and goal setting. As the outcome of communicative interventions are meant to have an impact on the lives of pre-symbolic communicators and their primary partners, it is essential that caregivers are active collaborators in selecting the goals and intervention approaches as well as through all the steps of intervention. The intervention process encompasses elements of initial screening, focused assessment, follow-up assessment, goal setting and designing methods, implementing intervention, and evaluating the effectiveness of an intervention. As formal assessments make it easier for the caretakers to participate and to have an active learning experience, there is a need to develop formal instruments where caretakers can take an active role in collecting and interpreting information. To support caretakers in setting goals related to interaction, it is important to include methods explicitly focused on interaction in the assessment process.

The third question about intervention methods focused on interaction, deals with how the activity of the pre-symbolic communicator and the activity of the interaction partner can be related to each other. Most methods are indirect and focus on changing the skills, attitudes, beliefs and behaviours of the partner or changing the physical context of the interaction. However, as the outcome is dependent on the activity of both partners, a communicative function can only be assessed by assessing the behaviours of the pre-symbolic communicator as well as the response from the caregiver. When it is hard to use intuitively known strategies to “read” the child, interventions need to be focused on helping caregivers to perceive and redefine the behaviours of the pre-symbolic communicator as commu-
nicative. Interaction interventions must be highly individualized and feedback on dyadic interaction must be based on what kind of interaction problems are identified as significant by the caregiver.

In summary, intervention regarding interaction for persons who function at a pre-symbolic level needs to be focused on the dyad. That is, the overall aim of interventions is to provide a basis for mutually rewarding interactions and full participation in social relationships for pre-symbolic communicators. To reach this, caretakers must be involved in all the steps in the intervention circle including assessment and goal setting. The intervention must be focused on the dyad and must be personalized.
Theory

The child with severe multiple disabilities

Any act of communication involves at least two persons. When one of those interacting partners is a child with severe multiple disabilities it will inevitably affect the communicative outcome. A sample of children with severe multiple disabilities is not a homogeneous group nor is multiple disabilities a specific diagnosis. The children may vary quite a lot in combinations of disabilities and severity of different disabilities.

Sometimes in the literature, a developmental communicative stage has been used instead to identify the targeted group, as, for example, pre-symbolic communicators, pre-intentional, non-symbolic or pre-conversational communicators. These labels are merited by the fact that there is evidence that individuals who experience similar communication difficulties may have much in common with regard to intervention requirements regardless of the specific disabilities involved (Granlund & Sundin, 1998). However, as these labels, per se, tell nothing about other personal attributes, they could as well be used to describe a typically developing child at that specific stage of development. When using typical developmental stages in communication as a norm in descriptions of atypically developing children, it is important to keep in mind that it does not mean an overall comparison. An older child, although with severe multiple disabilities, has a more diverse range of social experiences, other needs and interests than a younger child, and may also be influenced by a learning history of unsuccessful attempts to communicate (Goldbart, 1994). Descriptions of communicative behaviours in terms of normal parameters and developmental sequences may also be misleading or may not adequately reflect the competence of individuals with severe disabilities because over extended periods of time they may have learnt other and alternative means of communication (Mar & Sall, 1999).

There are always personal attributes that influence the development of psychosocial skills and it can be expected that atypical biological and neurological characteristics uniquely influence these skills (Sontag, 1996). Granlund and Olsson (1999) have used Bronfenbrenner’s (in Sontag, 1996) identification of three types of such characteristics: physical attributes, personal stimulus qualities and developmentally structuring attributes as a suggested means to document child characteristics that may influence the
communication. Physical attributes are, for example, age, sex and type of disability. These attributes are static in the sense that, although they may affect the child’s interaction with the environment, they cannot be affected by the environment. They are solely a function of the person. Personal stimulus qualities and developmentally structuring attributes are different and involve, to a higher degree, a mutual influence between child and environment and are developmentally instigative, that is they have the power to affect subsequent psychological and social growth. In that respect they are important factors when studying the child in his or her physical and social context.

**Physical attributes**

Individual skills in significant areas of body function and development can be regarded as physical attributes that serve as prerequisites for communication (Granlund & Olsson, 1987, 1993; Granlund et al., 1991). The extent to which an infant produces distinctive, readable behaviour to a large degree determines the possibilities for others to respond to the behaviours as communication (Dunst & Wortman Lowe, 1986). There are two different approaches in examining the impact of physical attributes on the communicative skills of a person with disability. One is to investigate relationships between the prerequisites and use of communicative skills in a sample of persons with varying disabilities. The other is to compare children with and without disabilities with regard to their use of communicative skills. In order to clarify the relationships between lack of prerequisites associated with different kinds of disabilities, and use of communicative form and function, Granlund and Olsson (1987, 1993) examined 41 students (aged 17-22 years) with intellectual and multiple disabilities at a vocational school. They found that mobility was correlated with the use of communication to signal both social interaction and behaviour regulation and that vision and the ability to physically manipulate objects were correlated with behaviour regulation and joint attention. They also found that the cognitive level was correlated with the discourse role of initiating an interaction and with the complexity of forms that were used, although most of the students used more immature forms of communication than could be expected with regard to their level of cognition.

When Mar and Sall (1999) examined the communicative profiles of 103 children and adolescents (aged 3-15 years) with intellectual disabilities, differences were noted in the pattern of communication forms and profiles between participants with severe versus profound intellectual disability, but
no age-relate differences (older versus younger individuals) were found. In spite of this it can, and should always be questioned to what degree results obtained from examining older children or adults are valid for younger children. Therefore, the investigation made by Granlund and Olsson (1987) was repeated using the same instruments for assessing individual skills and use of communication in a second study of younger children (publication I).

Ogletree, Wetherby, and Westling (1992) investigated the use of communicative skills among 10 children with profound intellectual disabilities (aged 6-12 years) and compared the results with the ones from a previously investigated group of typically developing children at the same pre-linguistic level of development (aged 10-12 months). They found that the children with intellectual disability had a more restricted and immature communicative profile in comparison to that displayed by typically developing children at the same developmental level. With the same rate of communicative acts per minute the children with intellectual disabilities used more behaviour regulation and less joint attention, initiated more but responded less and had less combination of gestures and vocalisation than the children without disabilities.

**Personal stimulus qualities**

Personal stimulus qualities are personal features that invite or discourage particular reactions from the environment that can either disrupt or foster the development of the child (Sontag, 1996). The biobehavioural state, defined as different stages of alertness, temperament/behavioural style and affective expressions are reported to have a significant bearing on the frequency and type of communication interactions for pre-symbolic communicators (Granlund & Björck-Åkesson, 1998; Granlund & Olsson, 1999; Wilder & Granlund, 2003). For children with disabilities, the personal stimulus qualities may work in another direction than for typically developing children. Caregivers to children with severe disabilities find it easier to interact with a child with a more intensive temperament, i.e. a hyper-dominated behavioural style, while caregivers to normally developing children find it more difficult to handle children who show an intensive temperament (Wilder & Granlund, 2003). When Guess, Rues, Roberts and Siegler-Causey (1993) investigated the relationships between behavioural state and communication among students with profound disabilities they found that the individuals only spent brief periods of time in the alert states, which are the most optimal states for communication. Although the conclu-
sions were that biobehavioral state seemed to be intrinsically controlled, the
time periods spent in alert states were both preceded and prolonged by
communicative interaction.

Wilder, Axelsson and Granlund (2004) compared how parents perceived
interaction with their child in three groups comprised of parents and their
child; 30 children with profound multiple disabilities (aged 2-10 years), 31
children (aged 4-16 months) that were normally functioning and development-
mentally matched with the first group and 30 children (aged 2-10 years)
that were normally functioning and that were matched to the first group for
chronological age. The results showed that irrespective of group the chil-
dren showed similar distributions of behaviour style except from the di-
mension attention span, which showed significant differences. Children
with profound multiple disabilities had a tendency to give attention to stim-
uli for a longer time than was demanded in the situation, while children in
the other two groups gave attention as long as it was adequate in the situa-
tion and turned to a new stimuli when it was presented.

As the body language and facial mimicry of children with profound mul-
tiple disabilities to a large degree are idiosyncratic because of body im-
pairments the number of expressions are restricted (Granlund & Björck-
Åkesson, 1998). As a consequence it could be expected that these children
have difficulties in showing different kinds of emotions. However, Wilder
et al. (2004), in the study described above, found that children with pro-
found multiple disabilities expressed the same amount of emotions as typi-
cally developing children matched by developmental level or matched by
age except that they had difficulties expressing more complex emotions as
curiosity and interest. These are emotions that demand a wider ability of
attention span. Goldbart (1994) also reports that a great majority of pre-
symbolic children display several affective expressions in a fairly consis-
tent manner, although this manner may deviate from the ones showed by
typically developing children. The assessment of a child’s unique expres-
sions could enhance the caregivers’ possibilities to read that child.

**Developmentally structuring attributes**

Developmentally structuring attributes are characterised by an active orien-
tation toward an interaction with the environment (Bronfenbrenner, 1992).
Consequently, it is closely linked to the child’s perception of being some-
one who can affect the situation, to the child’s initiatives and to the child’s
readiness to maintain interaction with the caregiver. Typically developing
children expand their curiosity and exploration of their environment in their
play. So do children with profound and multiple disabilities, although these children have fewer personal play skills and are more dependent on the caregiver in order to develop through their play (Brodin, 1999). Caregivers are exposed to a dual task, as play serves two different functions. These functions are, on one hand, the development of social interaction and communication strategies in a shared activity, and on the other hand, the function of the child’s possibilities to explore the world on his/her own and gradually develop an independence from the caregiver. With the awareness that play is important in child development, it is difficult to separate it from learning, particularly for children with severe multiple disabilities (Brodin, 1999). Children who do not spontaneously explore and interact with the environment and who appear to lack internal motivation to play are certainly a challenge to their caregivers. It becomes an intriguing task to decide how best to support the child’s play. According to Björklid and Fischbein (1996) the risk with a passive child and an active caregiver is that the caregiver takes an authoritarian role that will suppress rather than support the child’s play and if the caregiver is more passive there is a risk that the child will not get enough stimulation and feedback. Malone and Langone (1999) define different roles for the caregiver; stage manager, mediator, co-player, scribe/observer, planner, director/instructor and leader. They conclude that interventions are most successful when there is some shared meaning between the adult and the child. The least directive but still active way of supporting the play is to provide the child with an environment of motivating toys and objects that is possible for the child to be active with. For children with severe disabilities it appears that the factors that can be identified as detrimental to children’s play, mostly, if not entirely, are attributable to caregiver actions and under adult control (Malone & Langone, 1999).

Central concepts regarding communication

In order to present a theoretical framework valid for children with severe multiple disabilities, general theories about communication and typical communicative development have to be examined from the viewpoint of how this specific group of children fits into the theories. This is done by analysing central concepts regarding communication and, when appropriate, confronting them with research on children with severe multiple disabilities. The concept intention has been given an extensive space because of the fact that what is traditionally labelled as intentional communication
is highly questioned. In addition, alternative aspects on the concept, when related to children with severe multiple disabilities, are presented.

**Interaction**

In literature about child development, interaction is often used synonymously with social interaction or communication, which might cause confusion. In an attempt to clarify the concept I have chosen interaction as an encompassing concept that can be further specified (publication VI). *Interaction* in itself is simply interplay of different variables, sets of variables, or other phenomena affecting each other. An interaction can be one-way, that is one variable is affecting another variable. An interaction can also be two-way when different variables are affecting and affected by each other, and it is then a transactional interaction (Björklid & Fischbein, 1996). The interaction can take place within a person or between a person and the environment.

Interaction is *intrapersonal* when the interacting parts are within the person. A child’s behavioural state can, for example, affect the child’s motor activity in playing but the motor activity in the play can also affect the child’s level of arousal (Wilder & Granlund, 2003). A person also interacts with the physical or social environment. Interaction is referred to as exchanges between an active human organism and the persons, objects, and symbols in its immediate environment (Bronfenbrenner in Sontag, 1996). *Interaction with the physical environment* is, for example, when a child is playing with a toy. The child is affecting the toy, but also the form and function of the toy affects the child’s play with it. If the environment is a social context with other persons involved we can talk about social interaction. *Social interaction* means that persons affect and are affected by each other and this might occur even if there is no explicit contact, just being in the same room or place can be enough. This is what happens in children’s parallel play (Brodin, 1991; Ivory & McCollum, 1999).

If the persons are more explicitly relating to each other, as, for example, in playing with a ball or a give-and-take play, the social interaction can be referred to as *interpersonal interaction* or, if there are just two persons, a *dyadic interaction*. Interpersonal interaction is related to intrapersonal interaction as well as to interaction with the physical environment, as the relationship between persons is a function of characteristics of the individuals involved and of the environment in which the interaction occurs (Göransson, 1995). Interpersonal interaction can involve or be synonymous with *communication* depending on how this concept is defined.
Communication – definitions

Communication can be, and has been, defined in many ways; from regarding any behaviour in the presence of another individual as communicative, to only considering behaviours that has the purpose of affecting another person as communicative (Goldbart, 1994; Lloyd, Quist & Windsor, 1990). One extreme is the definition given by Ellis and Beatti (1986): “Communication occurs when one organism (the transmitter) encodes information into a signal which passes to another organism (the receiver) which decodes the signal and is capable of responding appropriately” (p.3). With this definition any kind of interaction between people, animals or any organism could be regarded as communication. This is close to what Fogel (1993a) depicts as a traditional information-processing perspective where “communication is said to occur if a receiver changes behaviour following the transmission of a signal” (p. 9) and implies that none of the partners need to be aware of the fact that they are communicating. Others, for example Burgoon, Le Poire and Rosenthal (1995) include an intent to achieve a goal; “communication is an inherently strategic, goal-oriented enterprise in which communicators often plan and enact behaviours designed to influence others” (p. 290). In definitions such as this, the essential element is the awareness and use of the partner as a means to a specific end. Communication is also defined as something that “involves the intention to convey an idea to someone else” (Sugarman, 1984, p. 27). When it is obvious that the actor is aware of his/her own intentions, communication is referred to as intentional communication. Camaioni (1993), however, goes as far as saying that it is not enough that a person has a conscious intent to affect another person. For communication to be regarded as intentional there also has to be an understanding of “the other person as capable of having intentions and of understanding one’s communicative intentions” (p. 93).

The choice of definition of communication depends on the purpose. A definition serves the function to include and to exclude. What you want to include or exclude depends on the aim of your work, in research as well as in clinical work. The definition also determines what theoretical framework will be useful and how other research findings can support or contradict your own experiences. Besides, the definition also has practical implications. It can be used as a demarcation to decide who is going to get service, treatment or a communication aid. Last, but not least important, it affects attitudes. How do you communicate with a “non-communicator”? In studies concerning children with normal development, definitional issues do not have any implications for treatment and interaction with the child. Typically developing children are treated as communicators long before they
reach the criteria of the more restricted definitions. In studies of persons with severe disabilities, definitional issues do have implications. A restrictive definition of communication may exclude some persons from communicative interventions or from being regarded as communicators. Goldbart (1994) states that: “For it is well established in the language acquisition literature that it is by being treated as communicators that we become communicators” (p. 16). This perspective is established by Dunst (1978) in the following definition: “The term communication is defined as any overt conventional or nonconventional behavior, whether used intentionally or not, that has the effect of arousing in an onlooker a belief that the signal producing organism is attempting to convey a message, make a demand, request, etc. to an onlooker” (p.111). As my studies involve persons with severe multiple disabilities and for the purpose of not excluding any person from being regarded as a communicator, communication in this thesis is defined: Communication occurs when messages are transmitted between persons, which happens when the behaviour of one person is assigned meaning or intent by another person.

**Communicative functions**

Communication is used to fulfil personal needs and desires as well as to establish contact with other persons and to share information and experiences. According to Seibert and Hogan (1982) any communicative act can have one of three functions; behaviour regulation, social interaction or joint attention. Behaviour regulation occurs when the partner is used as a means to reach a goal. Interaction with this function is of short duration; i.e. for each partner there is only one turn, either as an initiation of a demand or a request, or as a response to a demand or a request. Social interaction is when the other person is the focus of interest for social contact or a social routine. This function can last over several turns and in addition to initiating and responding there can also be a maintaining discourse role. Joint attention is characterized by sharing an experience of an object or of an event. This function can also last over several turns and can be used to initiate, to respond, or to maintain a communicative interaction.

A main difference between the three functions is that in social interaction and joint attention, the partner, as a person, and the social interaction in itself, is an essential goal for the interaction and when the communication is efficient it can lead to a maintained social interaction. Behaviour regulation, on the other hand, is less social because the interest is focused
on needs and desires and when communication is efficient the goal is readily met by the partner with no prolonged social interaction.

Granlund (1993) and Granlund and Olsson (1999) with reference to Light (1988) propose different approaches in assessing communicative functions depending on the level of symbol use of the communicators. In linguistic communication the communicative function can be determined from a single message utterance and it can be relatively easy to determine if there is, for example, a request, a greeting or a comment that is expressed. In communication at a pre-symbolic level, where the function cannot be inferred from the use of symbols, a context level where the activity of both partners is considered, i.e. how an activity is interpreted and responded to, is more appropriate. It is this latter approach that is used in the first empirical study in this thesis, where use of communicative functions is investigated.

**Communicative form; mode and complexity**

The communicative form is an essential factor that we have to deal with in communication with children with multiple disabilities. In research and intervention it plays a significant role because of its relevance for interpretation and for choosing an approach. The communicative form is defined in terms of *mode*, i.e. the kind of behaviour repertoire a child has, and as the *level of complexity* of how the child uses these behaviours (Granlund 1993).

In normal development, the expansion of behaviour repertoire in the early stages of development is closely linked to the development of motor skills. For children with severe multiple disabilities, as for typically developing children at an early stage of development, the behaviour repertoire mostly consists of gross body movements, movements with the hands, head and eyes, sounds or vocalizations. Later on in the development comes the use of some words (or signs) which might also be in the repertoire of children with multiple disabilities, although often very limited. Some children with multiple disabilities only possess a few of these skills and very often they are also limited in facial expressions, which inevitably will reduce their possibilities to express themselves. Research has also shown that it is not one, but a set of behaviours in certain configurations that conveys a message to the partner among typically developing children (Weinberg, Gianio & Tronick, 1989) as well as among children with multiple disabilities (Iacono, Carter, & Hook, 1998). Weinberg, et al (1989), in a study of fifty pairs of mothers and their six month old babies found that some facial expressions are more likely to appear together with certain behaviours than
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others and form coherent affective action configurations, which communicate a set of differentiated messages to the caregivers. They could distinguish two different configurations depending on whether the child was directed towards a person or an object and two different configurations communicating an active or a more passive negative attitude towards an event. Iacono et al. (1998), in their study of four children with multiple disabilities, found differences in behaviour patterns depending on what function was communicated. Gestures alone or with vocalization tended to be interpreted as requests while vocalizations and smiles tended to be interpreted as comments and responses.

The complexity of expressions is closely linked to the development of cognition and there have been many attempts to define different levels of complexity in communication. Many researchers (among others Camaioni, 1993 and Goldbart, 1994) have drawn on Piaget’s theory of cognitive development. As shown in Table 2, column 1, Goldbart (1994) presents an interpretation of Piaget’s six substages of the sensori-motor period in terms of a description of development of schemes of activity that can serve as communicative expressions, from reflexes to the beginning of thought. The emergence of the ability to differentiate between means and goals and deliberately use the appropriate means to achieve a certain goal, gives rise to skills that can be used to communicate. Camaioni (1993) presents a “tool-use” hypothesis related to Piaget’s sensori-motor stage 5 of causality (Table 2, column 2). According to this hypothesis there are three forms of tool use; the use of an object as a means to obtain another object, the use of another person to obtain an object and the use of an object to obtain another person’s attention. All three forms are manifestations of the same underlying causal capacity although the first form is non-social, as it is not involving another person. The other two forms, also defined as “proto-imperative” and “proto-declarative” (Bates, Camaioni & Volterra, 1975), involve another person and can be regarded as communicative. However, Camaioni (1993) warns against describing a child’s pre-linguistic behaviour in terms of linguistic functions and suggests that this use of the terminology blurs or explains away the differences between early and later behavioural patterns, in spite of the fact that they have a significant chronological distinction. When linked to communication, the third level of tool use fits better into Piaget’s sensory-motor stage 6 as it requires new means of achieving ends through mental combinations about the other person’s interest.

In my early studies of communication (Granlund & Olsson, 1987 and Granlund et al., 1991) four levels of communicative complexity are used (Table 2, column 3): i) natural reaction, which includes reflexes and is a
non goal-directed reaction to a contextual cue of internal feeling, ii) *action sequence*, which is a goal-directed behaviour sequence that is context bound and can be with or without an object, iii) *signal*, which is a goal-directed behaviour that is restricted in number of actions and time and that is bound to context or internal state, and iiiii) *symbol*, which is a formal (sign, spoken word or pointing to a graphic symbol), not context bound way to refer to and generalize about persons, situations and time.

Although persons with multiple disabilities may be limited in their behaviour repertoire by motor and sensory disabilities, and have a low level of complexity due to cognitive disabilities, they have to make the best of what they have got and in many instances they will be interpreted from the direction of their behaviours. Therefore, a classification in three categories of behaviours according to direction is thus proposed by Granlund and Olsson (1999) (Table 2, column 4). They suggest that behaviours can be classified as undirected, event or object-directed or person-directed. In many aspects this classification corresponds to Camaioni’s (1993) tool-use hypothesis, but has the advantage for persons with motor disabilities that it is less dependent on motor skills for tool use and thus functions at earlier stages of development. The first category, *undirected behaviours*, contains reflexes, i.e. behaviours that the person himself cannot refrain from performing, as well as developmentally very early responses to internal and external stimuli. They are correspondent to the first class of behaviours, natural reactions, as defined above by Granlund and Olsson (1987) and Granlund et al. (1991) and can exist at a lower developmental level than the two categories of directive behaviours. One of the few in the literature who regards these behaviours as communicative is Goldbart (1994) who states that: “reflex and very early responses to internal and external stimuli serve as signals to familiar adults who interpret them” (p.17). The second category consists of *event or object-directed behaviours*. A directed activity includes a goal orientation and can be related to the development of cause-effect as an ability to influence the environment. Goal orientation can occur both as a response to a stimulus, e.g. when the child turns towards the sound of a toy, and as an initiation to affect something, e.g. when the child reaches out his hand and touches the toy to make it sound. Object-directed behaviours indicate that the person also may use an object as a means to interact with another object. This, however, is not considered as a communicative action, for example by Camaioni (1993), since the action on its own, only indicates an interest in the object and not in another person. *Person-directed behaviours*, can, just as the former group, be described as goal-oriented actions but with the distinction that the action is directed to-
wards a person. Regardless of whether the intention is to take an interest in another person as an individual, or just as a means to reach another goal, the behaviour in itself is social in so far as it is directed towards another person. Between the two groups of directed behaviours there is no difference in cognitive development, as they both require an awareness of a goal external to the acting person. These behaviours can, in their simplest forms, correspond to what is defined as action sequences by Granlund and Olsson (1987) and Granlund et al. (1991) but could also be used with more complexity. Although developmentally similar, there is a reason to distinguish between behaviours directed towards objects and towards persons because, according to Weinberg et al. (1989), they involve different clusters of behavioural components in young children.

While most researchers have an individualistic approach to communicative behaviours and view single behaviours or combinations of behaviours as inherently individual skills, Stamp and Knapp (1990) and Fogel (1993a, 1993b) argue that communicative behaviours are integrally related to other behaviours not only by the same person, but also affected by simultaneous behaviours of the communication partner.

**Intent**

Some researchers incorporate intentionality as an essential part of how they define communication and in classifying communicative behaviours. As stated by Iacono et al. (1998), expressive communication, especially at an early stage of development, by tradition, is classified in developmental stages according to intent such as unintentional or pre-intentional and intentional communication. If we return to Goldbart’s (1994) interpretation of Piaget’s developmental stages (Table 2, column 1), she states that a first sign of intent is shown at the sensori-motor stage 3 when the child by secondary circular reactions learns to repeat an action that had a desired effect. She considers that intentionality is fully established at the next stage, stage 4, when the child can coordinate secondary schemes and establish a goal prior to initiation of an activity. Although there is no difference in causality between directing towards an object and towards a person, many researchers make a distinction in development between the existence of intentions as described above and the existence of intentional communication. Goldbart (1994) for example states that: “Intentionality is likely to be crucial for developing intentional communication as, until you realise you can affect the environment (intentionality), you are not going to realise that you can
specifically affect the behaviour of people in the environment ( intentional communication)” (p. 20).

As stated by Iacono et al. (1998), a child has begun to use communicative behaviours when both means-end and tool-use emerge at Piaget’s stage 5 and when the child can couple the goal-directed behaviour with the attempts to indicate the desires to an adult. Ogletree et al. (1992) have defined acts directed towards the receiver in one of the following manners as intentional communication: give/show objects, touch the other person, use an isolated gesture or vocalization while looking at the other person. Among the published criteria of intentional communication, there are those who only consider the direction to another person by gaze or body position, but most of them also include the alternate attention between receiver and referent (Cirrin & Rowland, 1985). The co-ordinated attention has become a salient marker of intentional communication and Dunst and Wortman Lowe (1986) refer to the act when the child uses an object to influence an adult’s attention or uses an adult as an agent to obtain a desired object as triadic communicative acts. Camaioni (1993) goes one step further and stresses the structural and functional difference between the use of proto-imperatives, i.e. the child using the adult as an agent to obtain a desired goal and the use of proto-declaratives, i.e. the child using an object to obtain attention from the adult. To use an object or another person to achieve a goal indicates an awareness of one’s own capability to influence the state of the world. To use an object to get another person’s attention, on the other hand, indicates an awareness of the other person as a subject with personal preferences and interests and an insight that this internal state of the other person can be influenced. Not until this is present is there a communicative intention (Camaioni, 1993). Adapting to this perspective, intentional communication is something that does not emerge until Piaget’s sensori-motor stage 6. Whatever stage in normal child development one would like to assign the emergence of communicative intent to, the use of conventional criteria of intentionality may not be adequate for persons who are not typically developing. Iacono et al. (1998) as well as Snell (2002) suggest that for children with severe and multiple disabilities there is a need for other criteria than the co-ordinated attention. They suggest markers such as the persistence or the change of quality of a signal until the goal is met, the use of a ritualized or context bound signal, awaiting a response from the receiver, terminating the signal or in other ways showing if the goal is met.

Stamp and Knapp (1990), reviewing the literature on intent in interpersonal communication, present three dominant perspectives. The first is a sender perspective, the second is a receiver perspective, and the third fo-
cuses on an interaction perspective. Within the sender perspective, consciousness and awareness of one’s own intentions play a significant role for encoding intentions. With reference to Andersen (Stamp & Knapp, 1986), four states of consciousness were identified. The first is minimal consciousness which is just the state of knowing that you are knowing or the consciousness of being. Second is the perceptual consciousness, which is a fairly low level of awareness but where there are possibilities to process perceptions. Third comes the constructual consciousness, which is an increased awareness about what we are doing and where activities can be directed and planned. Finally, there is the articulate consciousness, which is the highest level, where motives, plans and actions can be expressed. A person often varies between different states of consciousness and may even use several levels at the same time in a communicative act. When the child, for example, reaches for a desired object and vocalises persistently while looking at the adult, the child might be very much aware of the intent to get the object, more hazily aware of the intent to affect the adult in a certain direction and totally unaware of the intent behind the choice of expressions. The communicative act can also involve multiple intentions. There can be an intention towards a specific goal but also an intention to obtain this goal by specific means, as for example when the child chooses which adult to turn to. When an activity of a person with severe and multiple disabilities is noted, it is often obvious that the person wants something but less clear what the person wants and hard to know if the person himself is aware of his own intentions. In this case the first intention might be quite apparent to the partner while the second intention is unclear. Stamp and Knapp (1990) summarise the sender perspective stating that intentions can exist at multiple levels of consciousness; multiple intentions can co-exist in an act of communication, and intention and consciousness can change during the process of interaction.

When moving over to the perspective of the receiver it might be more adequate to talk about ascribed intentions, the way in which receivers attribute intentions to the sender. There can be intentions that are not demonstrated in the actions but since the human being is an intentional system there cannot be an activity without any intention. With this perspective it is also possible to say that all behaviours have a communicative potential and whether it will turn into an act of communication depends on the partner’s willingness to interpret the behaviour as having a message value. Based on Dennett’s (1987) perspective of the procedure of determining intentions the process starts with the decoder treating the person whose behaviours are to be interpreted as a rational agent, someone who has a reason for his or her
behaviours, whether that person has a conscious awareness of his/her own intentions or not. Then, with help of the context, it has to be figured out which beliefs and desires are guiding the behaviours of the person. Finally, it must be assumed that the person is a rational agent who will act to fulfil his or her purpose. According to Cobb (1994), the social construct of intentions is necessary to make both partners agents in the social “game” of communication. There is often a conscious or structured over-interpretation, which implies a reflective and analytic stance on the part of the interactive partner. If not explicitly invited into communication by clear conventional modes the sensitive partner acts “as if” there is a potential for communication. There are two different ways of ascribing intentions to the activity of a person. The retrospective “because of” refers to the interpretation of the cause of a behaviour or reaction while the prospective “in order to” assigns a goal to achieve. Harding (1983) describes that mothers tend to attribute meaning but not intent to the behaviours of their babies during the first six months and then attribute intent as well as meaning, i.e. treats the baby as an intentional communicator. Here we can see a discrepancy between formal researcher criteria of the behaviour of the child as an encoder of intentions and mothers’ perspectives as decoders of the child’s behaviours. While most researchers agree that intentional communication is not demonstrated until Piaget’s stage 4-5 or even later, mothers treat their children as intentional communicators from approximately Piaget’s stage 3. This is totally congruent with the earlier cited statement from Goldbart (1994) that “it is by being treated as communicators that we become communicators” (p. 16).

From a receiver perspective the main issue is to identify those behaviours that might be attributed with intent. In order to get data on attributions made in every day situations, Stamp and Knapp (1990) asked sixty-five students for the criteria they used to determine intentionality. Four categories of criteria emerged. The first way of identifying whether someone was doing something intentionally was linked to the other person’s nonverbal behaviour, such as facial expression, sincerity and tone of voice, eye contact etc. Another category included factors that suggest interrelationships between behaviour and context and involved the timing of behaviours, the length and timing of an act, the deliberation before something is done, hesitations, etc. A third category was associated with the relationship with the other person and attribution of intent was based on out-of-the-ordinary looks or behaviour, whether the action was habitual or a change from regular personality or expression patterns, and past experiences with the person. The last category involved a general understanding or intuitive knowledge
of when something was done with intent and was often vague in descriptions. This indicates that even from a receiver perspective some attributions of intent are based on a low level of conscious awareness of what actually is interpreted. This can be related to how many parents and closely related caregivers have an unspoken knowledge about the preferences and needs of their children and intuitively “read” them.

Taking the stance of one of the individuals in an interaction, either the encoder or decoder might cause conflicts and an argumentation about what is right or wrong. Instead of placing the two perspectives in opposition to one another and debating the relative merits of each perspective, Stamp and Knapp (1990) suggest a third perspective, the interaction perspective, which examines the entity produced out of the combined perspectives. They declare that: “The interactional perspective moves beyond the encoder and decoder perspectives,..., and examines the manner in which participants within the context of a particular interaction structure intent. Any particular gesture or utterance which is either encoded with intent or attributed with intent by a decoder is only understandable within the context of the relationship or the particular interaction taking place” (Stamp & Knapp, 1990, p. 291). To focus on an interaction perspective is not to completely abandon the other two perspectives, rather to complete these as done by Dennett (1987) when he describes first-order and second-order intentional systems (Table 2, column 5). The first order intentional system is a linear individual perspective where the individual is regarded as having beliefs and desires but no beliefs and desires about beliefs and desires. Stamp and Knapp (1990) regard this linear analysis as an intention-behaviour sequence with one person causing an intentional-behavioural effect in the other. It corresponds to the former description about how an individual can have an intent to obtain a goal. The second order intentional system is, by Stamp and Knapp (1990), regarded as an interactional perspective where there are beliefs and desires about beliefs and desires. This can be related to the previously described level of intentional communication (Camaioni, 1993) in which the person has an expectation that another person has his/her own intents, although Camaioni does not take into consideration that the behaviours of one person are affected by simultaneous behaviours of the other person. Fogel (1993b) even argues that during the process of communication both partners are continuously modifying their actions with regard to the actions of the partner in such a way that it is impossible to divide the roles of the partners into sender and receiver. Thus an interaction perspective would be more appropriate. The interaction approach, however encompassing it might appear, is not unproblematic. It inevitably raises the
question whether a true meaning or intention really can exist and can be interpreted if it is dynamically and interactionally created. It also raises questions about how to study communication if not even the persons involved, and at the least an external observer, can fully interpret the behaviours and depict all the intentions involved. However, Stamp and Knapp (1990) state that intentional communication is not a concept that can be attached to single behaviours or interpretation of those behaviours. Instead they stipulate that “Relational participants are continually defining their relationship through the verbal and nonverbal messages they enact with one another during their ongoing interaction; thus the relationship is continually being negotiated and renegotiated. Intentionality, in this perspective, would be attached, in some oblique way, to all messages within the context of the interaction” (p. 293). Fogel (1993b) further suggests that “…intention, memory and meaning are inevitably inherent in all forms of interpersonal communication, even between a parent and a very young infant” (p. 40).

In interaction with familiar partners, the behaviours of persons with severe multiple disabilities seem to be assigned intentionality and a meaning regardless of whether or not these behaviours meet published criteria for intentionality (Carter & Iacono, 2002; Snell, 2002). Adopting the belief that there is always an intent underlying any human behaviour and that it is the demonstrated or assigned level of conscious awareness that is critical to the interpretation, it seems more relevant to discuss possible levels of awareness of the person’s own intent than to conclude that there is an intent or not. Therefore, a division into four levels of awareness of one’s own intent is proposed in publication II and VI. The four levels are; unawareness of any intent, goal-intentional level, means-intentional level and partner-intentional level. Column 6, in Table 2, shows how these levels correspond to the classification of developmental levels of cognition, communicative form and intentions in the reviewed literature. The levels can be used to depict a demonstrated level of awareness of intent as well as being used to depict different levels of interpreted intentions, no matter what behavioural evidence there is.

The first level, unawareness of any intent, is the level at which the body as a system reacts to a situation with reflexes, natural reactions and primary circular reactions, that are undirected. These physical reactions are given a retrospective interpretation, i.e. the person does this because of a need or a feeling and the communicative function is mostly a behaviour regulation function. At the second level, goal-intentional, there is a simple awareness of cause and effect. The person uses actions and action sequences, so called secondary circular reactions or co-ordinated secondary schemes. The activ-
ity is given a prospective interpretation, i.e. the person does this in order to obtain a goal. The activity can be directed towards an object or a person and have a behaviour regulation or a social interaction function. At the third level, the means-intentional level, the person is aware of the possibilities of achieving a goal through the use of a tool. It can be an object that is used to get another object or it can be a person who is used to get an object or an event. It can still be achieved with non-verbal behaviours but also with signals and symbols. When it is a person who is used to obtain a goal it has a behaviour regulation function. Finally, the partner-intentional level indicates that there are beliefs and desires about beliefs and desires in the other person, the person has thoughts about the partner as a subject with his/her own intentions. At this level an object as well as signals and symbols can be used to gain the attention of the partner and the goal is to share an experience, which gives the communication a joint attention function.

**Communicative content and interpreting the meaning**

In literature about communication, especially concerning persons with multiple disabilities, the communicative content is often referred to as the message or the meaning that is transferred by behaviours and closely linked to function and intent depending on the sender or receiver perspective (Stamp & Knapp, 1990). With a sender perspective one can say that behaviours convey a message that has a certain function. From a receiver perspective, on the other hand, behaviours are interpreted as having a meaning and as coming with an intent. Meanings and intent are not parallel. We may ascribe a meaning to a behaviour, but we may not be certain of the kind of intent that is present. Neverthless, to attribute behaviour with a certain meaning or intent requires an interpretation. If and how a message is interpreted, depends on several factors relating to the two partners as well as external factors in the environment.

Clarity of the behaviours transmitting the message and the readiness of the partner to understand and “read” those behaviours are some of those important factors (Trad, 1994). As Goldbart (1994) points out, even reflexes and other early responses to internal and external stimuli can serve as signals to familiar people who interpret them. This implies that any behaviours of a person can be treated as having a message even at an early stage of development. However, if the behaviour regularities and normal configurations that help parents to use intuitively known strategies to “read” their children are not present it might cause confusion (Harding, 1983; Iacono et al, 1998; Ware, 1996). Harding (1983) has shown that mothers of
normally developing children interpret their children from vocalisation, facial expression, and gestures, but not from broader physical actions. However, according to experiences by Goldbart (1994), children with serious disabilities react with more individual behaviours and there is a need for measures and methods that can assist in individual-specific behaviour analysis.

Meaning is not solely derived from what the person does but also with inference from the partner’s own former experiences, feelings and attitudes and prior knowledge about the person as well as about the context (Sperber & Wilson, 1986; Stamp & Knapp, 1990). The less explicit a message is, the greater is the dependence on inference in interpretation and there is always a risk that those who act as interpreters assign a meaning that reflects their own hopes and desires. With this comes the question, “Whose message is it?” In some cases there might be a need to validate the interpretations (publication II).

According to Fogel (1993a) the communicative content can also be regarded as something mutually created where each of the partners influences the other while the communicative act is on-going so that whatever is shared is created together. None of the individuals involved has a complete message known in advance and communicated to the other. This is the approach that is used in the second and third empirical studies (publication IV and V).

Conclusions – Communication with persons with multiple disabilities

As exemplified, there are several ways to define communication but common features for the definitions are that communication involves a transmission of a message (or meaning) between at least two persons (or organisms). The message, i.e. what the communication is about, as well as the intent, i.e. the reason for acting, are internal constructions. As the mind will forever remain inaccessible to other persons, the internal state can only be understood and interpreted from the transmission via external representation where the communicative form serves as the code. The term “code” is used as a comfortable metaphor to signify that the message in itself is not understandable, but must be conveyed by way of specific behaviour. The code that is assumed to be in force is the one we know from numerous studies on typical child development, and, from this knowledge, conclusions have also been drawn on intentionality. Due to developmental constraints, persons with multiple disabilities don’t have access to the same
“code book” as typically developing persons have. Therefore, external evidence for communicative intent, taken from the repertoire of normally developing persons and the absence of these observable features cannot in itself be taken as proof for unintentional communication by atypically developing persons. For this group of persons, it is therefore not relevant to talk about intentional or unintentional or even pre-intentional communication. Furthermore, as there is always some kind of intent underlying a human activity, every behaviour has a communicative potential, and it follows that communicative functions must be determined from the activity of both partners. The persons involved in communication are often given a specific role as a sender or encoder of a message and as a receiver or decoder of the message. Adopting an interaction approach to communication, where both partners are continuously affecting each other, it would, however, be more appropriate to label them as communication partners or interaction partners (Stamp & Knapp, 1990; Fogel, 1993a, 1993b).

As can be seen from the review of different concepts relating to communication there are two bodies of literature that form our knowledge within this area. One consists of research and theory describing communication in typical development for persons without disabilities and the other describing how communication differs when one of the communication partners has a disability. In disability research the focus has been either on the performance of the child or the performance of the caregiver and how they are affecting each other in a kind of cause and effect chain. Qualities of communicative interaction that appear to be optimal for children without disabilities have then been primary targets of interaction interventions for children with disabilities (McCollum & Hemmeter, 1997). However, “research is not available on which to base judgements about whether the factors that appear to support optimal development in young children with disabilities are the same as those that support the optimal development of young children without disabilities” (McCollum & Hemmeter, 1997, p. 552). The differences found between dyadic interaction with atypically developing children and dyads with typically developing children may reflect a functional adaptation to the unique child’s conditions, made to achieve a functional and mutually rewarding interaction. Therefore, the traditional research on persons with disabilities and their communication partners needs to be supplemented with research on communicative processes where persons with disabilities are involved.
Research approaches and methodological considerations

Interaction can be analysed from two perspectives (Björklid & Fischbein, 1996). The first regards the behaviour of an individual as determined by either individual or environmental factors or by a combination of both. It is a one directional relationship where dependent variables and independent variables are measured and interaction effects are statistically analysed. The other perspective regards the behaviour of an individual as something that is mutually affecting and affected by other factors. The interaction can be said to be transactional when the interaction relationships make it impossible to separate influences from one factor on another factor. Then the interaction effect has to be studied as complex patterns of relationships that can only be understood in a context.

Different approaches can be regarded as different ways of collecting, structuring and analysing data but also as different ways of interpreting and treating the findings. Within the empirical studies in this thesis, different research approaches are applied as a consequence of different focuses on communication. The first focus, which was on communication skills in the child with disabilities, was met by a variable-based approach that, with a three-step analysis, turned into a person-based approach. From a focus solely on the child, the interest turned to encompass the communication partner as well, that is the dyadic interaction, and the focus moved from the persons involved to the communicative process between them. As the process could not be anticipated in advance, an inductive approach was used, and a system theory framework was chosen to study the multidimensional relationships which all together resulted in narrative descriptions.

From a group-pattern approach to a person-pattern approach

The first study can be regarded as a follow up on previous studies, which investigated the relationships between individual characteristics and environmental factors as independent variables and use of communication as a dependent variable (Granlund & Olsson, 1987, 1993; Granlund et al., 1991). The first reason to repeat the earlier studies was to study a different age group of persons (this time pre-school children while the earlier studies concerned adolescents and young adults) and also to concentrate on more severe and multiple disabilities. The second reason was to study the impact of environmental variables from another perspective (in the earlier studies the environment was investigated through questionnaires about environmental factors, this time each child was observed under two different set-
ting conditions). A third reason to conduct a new study was to analyse individual performances in addition to the group results.

The results obtained in previous studies gave information about interrelationships among variables at group level, for example how type and level of disabilities were correlated with the use of different communicative functions and use of level of complexity in communicative behaviours. Even if all these variables can be regarded as personal characteristics, inferences about how the variables function within individuals cannot be made. According to Magnusson (2003) there are two complementary approaches, the variable approach and the person approach. The variable approach can help to identify working components of the individual but when we want to understand how these components operate together in the integrated individual there is a need for a person approach. In the person approach, the components or variables investigated are described as parts of the wholeness of a single individual. Rather than follow each variable through persons, each person is followed through variables. The person approach builds on a holistic-interactionistic perspective that states that “the totality gets its characteristics features and properties from the interaction among elements involved, not from the effect of each isolated part on the totality. Each component of the structures and processes gets its functional significance from the role it plays in the total functioning of the individual. The whole picture has an information value beyond what is contained in the separate parts.” (Magnusson, 2003, pp. 10-11).

To get information at the group level as well as at the person level a three-tiered method of analysis proposed by Light (1999) was chosen. At the first level of analysis, the molar level, relationships between independent and dependent variables are explored using quantitative measurements and statistical analysis methods. At the second level, the intermediate level, the proportions of participants whose results are either congruent with or differ from the group results are explored. The third level, the molecular level, is used to give an in-depth description of a few individuals that represent phenomena of interest, either as being typical or atypical compared to the overall group. The three-tiered method has the advantage of being especially useful when the population is a heterogeneous one and when focusing solely on group results at the molar level can gloss over individual performance patterns. In addition, sample sizes that normally are too small to allow statistical analysis can be statistically treated since the group results at the intermediate level are validated by revealing the number of subjects that correspond to the group pattern and the number of subjects that deviate from the group pattern. At the molecular level, then, cases can be selected
to further demonstrate how important individual differences can be found in the patterning of the investigated variables.

From the person with disabilities to the communication partner and the process

The findings in the first study (publication I) of intra-group variability in outcomes that could not be explained by individual characteristics, moved the focus to the dyad and to the process of communication between individuals, or as expressed by Rutter (1983), “the identification of some form of interaction rarely provides information on the mechanisms that underlie the interaction. The finding of an interactive effect, therefore, constitutes not the end of search but rather the beginning for a further set of investigations designed to test hypotheses on processes” (p. 315). Hypotheses on processes bring the communication partner into focus and, as revealed in publication II, there are several theories about interaction and child development in general that can add to the understanding of influences on the interaction between a child with severe multiple disabilities and the caregiver.

Traditionally in communication research, the role of the partner mostly has been studied in the same way as the role of the child, that is, the focus has been on single variables, such as partner strategies or partner characteristics, which have then been the target for interventions. Although outcome evaluations indicate that training partner strategies may result in a better understanding and eliciting of responses from pre-symbolic communicators, there is only a moderate statistical relationship between intervention effects on communication partners and pre-symbolic communicators (Granlund & Olsson, 1999). Wachs (2000) criticises what he calls the human development sciences, for imitating the physical sciences in fragmentation, i.e. focusing on small specific elements taken in isolation. He states that when more than one influence is studied, paired combinations tend to be the norm and there is little concern for how the elements or combinations fit into a larger systems framework. That both partners are mutually affecting each other and that communication must be viewed from a more inclusive and transactional perspective, is further emphasised by Kaiser and Goetz (1993). They request new modes for analysing the contribution of mode, context, and patterns of social interaction involving persons with severe disabilities. Instead of viewing the person with severe disabilities as deficient in communication skills, the communication partners must be regarded as mutually influencing and adapting to each other, which will be an
important step to a fuller understanding of the communicative process. It also broadens the range of issues that could be empirically investigated and emphasises the importance of varied approaches to enhance the communication process. In order to provide interventions that are personalized to fit different communicative needs and behaviours, there is also an explicit need to study unique processes within unique dyads (Ware, 1994; McCollum & Hemmeter, 1997), which was the purpose of the second and the third study.

**From a deductive approach to an inductive approach**

The intention to examine a process in the second and the third study, and the fact that it was not decided a priori what to look for, merited an inductive approach (Maxwell, 1996). According to Patton (1983) there are three main strategies in conducting qualitative research; a holistic view, an inductive approach and a naturalistic inquiry. These three strategies are not exclusive and “Holistic-inductive research through naturalistic inquiry is a strategic ideal. In conceptualization, a pure qualitative methodological strategy emphasizes a holistic approach where the researcher neither manipulates the setting under study nor predetermines what variables or categories are worth measuring. In practice, however, it is important to recognize that holistic-inductive analysis and naturalistic inquiry are always a matter of degree.” (p. 46).

The naturalistic inquiry means that aiming at understanding naturally occurring phenomena in relation to their context, the situation is not manipulated by the researcher. To investigate communication in a natural environment is, however, not restricted to qualitative studies. The importance of evaluating a communicative skill in a functional context, i.e. in the environment where it is actually used, has been stressed by several researchers (among others Canale, 1983; Light, 1989; Scruggs, Mastropieri, Forness & Kavale, 1988). In all three empirical studies in this thesis the situation in which the children were observed was a naturally occurring situation in their daily lives at their pre-schools. The differences between the studies were rather on how the video recordings of communicative activity were treated in data collection and how data was analysed. The holistic approach, in contrast to experimental or quasi-experimental designs, is open to collecting data on any number of aspects of the setting in order to put together a complete picture of the dynamics of a particular situation. The inductive approach means that the researcher attempts to understand the situation without imposing pre-existing expectations on it. As a contrast to
the hypothetical-deductive approach, which requires the statement of specific research hypotheses and specification of variables before data collection, the important dimensions are allowed to emerge from analysis as well as the structuring of data. In the first study the communicative activity was divided into smaller criteria related units (communication variables) and analysed within specific time units (number per minute). In the second and the third study there were no pre-determined sets of phenomena to be studied. The video recordings were used as a possibility for the observer to go back and forth in the material and collect data that at first could be overlooked but were given their meaning relative to the context and emerging patterns. In the same way categories emerged as they got their relevance in the context and when the process was divided into units these were set by changes in the content rather than by the clock.

A system theory approach

The second and the third study in this thesis initially attempted to put the individual communication behaviours into categories as similarities and differences emerged. However, when it came to analysing and putting the categories back into a holistic frame of reference, this approach seemed insufficient. It could never depict the process of what was going on between the child and caregiver. According to Patton (1983) a danger in qualitative analysis is that when the researcher begins to consider causes, consequences, and relationships they fall back on the linear assumptions of quantitative analysis and begin to specify isolated variables that are mechanically linked together out of context, and thus, miss the holistic picture of the process. The question of whether the process of human communication should be reduced in order to easily understand it, or if the complexity of communication should be honoured at the possible risk of clarity, has been raised by Keaten, Nardin, Pribyle and Vartanian (1994). They argue that both quantitative and qualitative research paradigms are reductive. Both approaches reduce the phenomena studied, either by statistics or by coding, into categories and fail to investigate the relationships between variables or the interaction between categories in a dynamic and complicated system. Since both quantitative and qualitative paradigms inadequately address complex systems, there is a need for a paradigm that leads to an understanding of communication as a complex system and that is purer in its holistic view. Keaten et al. (1994) suggest chaos theory as a scientific approach to move away from reductionism and towards an understanding of the complexity of interpersonal communication. Fogel (1993a,
1993b) also has a system theory approach when he suggests that interpersonal communication best can be understood as a continuous process system.

Although system theory has been suggested as a research paradigm for any human communication process, its characteristics fit especially well when examining communicative processes involving pre-symbolic communicators. According to von Bertalanffy (1968), systems are “…governed by dynamic interaction of their components; later on, fixed arrangements and conditions of constraints are established which render the system and its parts more efficient, but also gradually diminish and eventually abolish its equipotentiality.” (p. 43-44). Applying this theory to communication means that the more formalised and rule governed communication is, like in grammatical language, the more efficient it is. The message is fairly quickly grasped by both participants. In communication with persons with severe multiple disabilities, the equipotentiality is greater. There are many possible interpretations and there might be a need for a lot of negotiation before consensus is reached about the meaning. In these cases, the system is more open to influences from other systems and is also more dynamic (Granlund & Olsson, 1999; Grove et al., 1999). Bateson (1987) stresses the relationship between content (in this case the meaning of behaviours) and context. A behaviour is given its meaning in the context of other behaviours of that person and the behaviours of a specific person are given their meaning in the context of behaviours of the communication partner, and both persons’ behaviours are given their meaning in the context of the situation.

In publication III, system theory is discussed as a possible framework for studying communication between persons with severe multiple disabilities and significant others. Although system theory has been proved to be efficient in mapping multidimensional relationships, it is said to “be easy to put anything into it but it is still hard to get anything out of it” and it may result in models that are either too vague or too complex to be empirically tested. In the second and the third study, however, a system theory approach was considered not only as a theoretical framework, but also empirically tested as a methodological model for analysis. The studies were designed to encompass both persons in the context and, in particular, the process of communication between those two persons.
A narrative approach

System theory provides a wide range of possibilities as a framework for analysis or as a “script”. In the second and the third study in this thesis, two different “scripts” are tested for analysis of the process. To follow the persons through the communicative process and in a narrative way describe what is happening, is to tell a story. The question is, whose story? Davis (1991), with reference to phenomenology, states that rather than trying to understand the world by examining its structure, the researcher has to account for the ways individuals define and reflect upon situations. By analysing observable phenomena and the relationships between them, and trying to understand what they mean to the observed actors, the researcher tries to discover how meaning is constructed, not the structure of meaning. Since meaning is always within the subject, an objective understanding is impossible and there will always be an impact of the researcher as an interpreter. Thus the description of a communicative process will never be an objective description but rather a creation of a story about a communicative process.

Communication models

In structuring the knowledge within a certain field of interest, models are useful tools. They can assist in understanding the function of different parts and the interaction between parts. When communication involves a person with severe multiple disabilities, an adequate model must be one that can be valid for any kind of expressions, conventional and non-conventional, and one that makes no differences between intentional and unintentional communication. The models presented below are models that can be applied to this kind of communication.

Communication as a linear model or as a dynamic process system

There are mainly two different ideas about communicative interaction, an individual, linear approach and an interactional, dynamic process approach (Fogel, 1993a, 1993b; Stamp & Knapp, 1990). In publication II, these two models are also called the information process model and the continuous process model. Within the first approach, the focus is on the individuals in the interaction, one at a time, and discrete actions of the interactants are analysed on single unit levels. Communication is presented as linear, that is, as consisting of discrete signals transmitted along channels
from one person to another in a causal chain of cause and effect. The sender encodes a message, which is transmitted to a receiver, who decodes the message for its meaning. There is a specific message that is constructed to reflect a certain intent and to serve a certain function. Thus this approach, which is the most commonly and traditionally used approach in studying interpersonal communication, has been a useful framework in dealing with issues of coding, transmission and decoding of a specific message for example in order to examine the use of communicative form or to determine the use of different communicative functions.

However, not all researchers agree that communication can be studied from the overt behaviours of the communication partners or as expressed by Frith (1998): “The lesson from autism is that true human two-way communication relies on the ability to attribute intentions and other mental states. Communication is thus more similar to mind-reading than it is to encoding and decoding.” (p. 57). Another researcher, Fogel (1993a, 1993b), argues that the discrete state is an oversimplification of what is really taking place in human interaction and that communication should rather be viewed as a continuous process system where the partners adapt to each other and mutually co-regulate their actions.

The other approach, the interactional and dynamic orientation, argues that behaviour occurs on multiple levels of organization and that individual behaviours are integrally related to other behaviours by the same person as well as affected by simultaneous behaviours of the other interactant. Within this approach, communication can be studied as a dynamic process. The actions of both participants are changing continuously without one of them waiting for the other to complete a turn, thus making it impossible to determine who is the sender and who is the receiver. The participants are involved in a constant flow of causes and effects that cannot be separated into discrete units. Nor can a message be totally related to one of the partners as it can be modified and changed in relation to the activity of the other person.

When communication is regarded as consisting of discrete units in a linear model there is a risk that the communicative interaction will break down when there is an expectation of one true message and coding/decoding problems arise. If, on the other hand, the communicative act is regarded as a dynamic process there is always a possibility to create a meaning as both partners actively adjust to each other and modify their own actions. With this view of communication the communicative competence or lack of competence cannot be related to one of the partners, rather it is within the dyad.
Communicative competence

According to Light (1989) communicative competence is a relative and dynamic, interpersonal construct. From this basis Light has proposed a definition that can form a model for evaluating communicative competence of individuals using augmentative and alternative communication (AAC) systems. The competence consists of knowledge, judgement and skills in four interrelated areas: linguistic competence, operational competence, social competence and strategic competence. The first two areas, linguistic and operational competence refer to the use of the tools of communication while the other two areas, social and strategic competence reflect the social skills used in interaction with other persons.

Although the definition was made for AAC system use, which in general implies a symbol use, Granlund (1993), reviewing current research within the field, has further elaborated on the relative and dynamic aspects of communicative competence in relation to communicative competence of non-symbolic persons with profound mental retardation and/or other kinds of disabilities. According to Granlund (1993) any of the four areas of competence can be related to person aspects, environment aspects and mission aspects. The person aspect refers to the effect of different kinds of disabilities on the competence. The environment aspect focuses on demands and adaptations in the physical and social environment of the person with disabilities. The mission aspect focuses on certain requirements in communication. Granlund summarises the findings from the review: “Due to their limited behavior repertoire, individuals with profound mental retardation must be able to express needs, feelings, and desires within a variety of communicative functions and discourse roles with a very limited number of expressions. For this reason, the communicative competence of persons with profound mental retardation will show substantial variation dependent on context, as well as mission and will not be as stable as the communicative competence of persons without disabilities”. (p. 57).

In order to analyse interpersonal interaction Göransson (1995) has developed a model, originally based on a comprehensive view of the individual in interaction with environment (Kylén, 1986), for analysing the interaction structure and dynamics between the person, the environment and the interpersonal interaction. Göransson states that each part is dependent on the other two parts and that they are continuously affecting and affected by each other in a dynamic interaction, but as each part also has its own structure and inner dynamic, to some extent they also develop independently. Interpersonal interaction skills for example are divided into a cognitive di-
mension and a behaviour dimension that, as parts of the social competence, to some degree, are independent of other cognitive and behaviour skills.

As revealed above different models contribute to varied perspectives on communication. The linear model represents a traditional view on the interaction between two persons. Although not explicitly used as a model in any of the empirical studies in this thesis it fits into the historical background and represents the person characteristic perspective. As it deals with discrete units it also fits into the variable approach that is used in the first study (publication I). The dynamic process is less developed in research but although it is applicable to all human communication it might be an especially fruitful approach to study communication between persons with severe multiple disabilities and their communication partners. This approach is discussed as a research framework (publication III) and then applied as a methodology for analysis in the second and third empirical studies in this thesis (publication IV and V). The definition of communicative competence and its application as a model is not used as a framework in the empirical studies but serves as a basis for understanding the structure and dynamics between the parts in a system. For the purpose of investigating more in detail how these parts are related to each other there is a need for models that can be used in analysis of what is really going on in the communicative process.
Methods

Subject selection

The three empirical studies in this thesis are linked together by the subjects within the studies. Children with severe multiple disabilities form a diverse group and large intra-group variability is to be expected in any study. For the purpose of exploring the value of different research approaches and methods for analysis, there was a value in not changing the subject sample but instead studying children from the same small sample from different viewpoints. The sample of subjects for the first study consisted of nine pre-school children with severe to profound multiple disabilities. They were identified by early intervention consultants in one primary community as having moderate to profound intellectual disability and additional vision/and or motor disability. Two of the children used single words or combinations of words or signs, although no grammatical language, while the other children used pre-symbolic expressions. None of the children regularly used any kind of aided communication, like a picture board or technical devices. Two of the children who were more thoroughly described in the third step of the first study were selected for the second and the third study.

The first study

The first study (publication I) was designed to investigate the relationships between individual-specific characteristics (type and degree of disabilities) and the use of communicative functions across two different setting conditions. The study was also designed to investigate to what extent communication patterns evident in group results were representative of those of individual members of the group and to provide an in-depth description of a few of those individuals.

Data on individual-specific characteristics was collected through structured interviews following a questionnaire used and validated in former studies (Granlund et al., 1991). The results from the interviews were validated by parents and pre-school staff. Use of communicative functions was observed from video recordings of naturally occurring play sessions in two settings with different setting conditions and analysed with the help of a checklist, the Early Social Communication Scales, ESCS (Seibert & Ho-
gan, 1982; Karlan, Ward, Pennington, & Granlund, 1985). Two independent observers were used for 35% of the observations in one setting condition and for 37% of the observations in the other setting condition and the inter-observer agreement was satisfactory (0.74-0.88).

At the first level of the three-tiered analysis, the relationships between independent and dependent variables were examined by correlating data on child characteristics (cognition, vision, mobility and manipulation) with performances in use of the communicative functions (initiations, responses and maintenance in social interaction and joint attention and initiations and responses in behaviour regulation). The mean rate of use of the different communicative functions was also determined for each child in each of the two setting conditions, manipulation conditions (favourite toys and communication partner were within reach) or mobility conditions (favourite toys and communication partner were out of reach but still within the child’s sphere of interest). To investigate the relationships between setting and use of communicative functions, the rate of use of each communicative function for each child was transformed to the percentage of the total rate of use of communicative functions in the actual setting. The mean across children was then calculated for each function within each setting condition.

The next step in the three-tiered method of analysis was to investigate to what extent the group results could be regarded as representative of the individuals in the study. This was addressed by analysing how each child was congruent with or varied from the correlations that were significant for group results. A deviation was, for example, noted if the group results showed significant correlation between vision and use of behaviour regulation in the mobility setting and a child with low scores in vision still had high scores in use of behaviour regulation in that setting condition. A deviation could just as well be the opposite; a child could have high scores in one of the child characteristics, that is a mild disability, but low scores in a communication variable, that was supposed to be related to that disability. To investigate to what degree the group pattern of different use of communicative functions in the two setting conditions was valid, the two settings were compared with regard to use of communicative functions for each child.

For the third step in the analysis, three children were selected, Ian, Helen and Bibbi. Ian and Helen were selected on the basis that they had similar and very profound disabilities in all of the assessed areas but differed in their rate of communication. Ian was congruent with the group pattern and had a low rate of use of communication while Helen deviated from the
group pattern and had a fairly high rate despite severe disabilities. The third child, Bibbi, was selected as a child who had less severe disabilities than the other two but had a fairly low rate of communication, and consequently also deviated from the group pattern.

The second and the third study

The second and third studies (publication IV and V) are both case studies on single individuals selected from the first study. The case selected for the second study was Ian, a 6:7 year old boy, who was typical according to the group results in the previous study. He was the child who had the most profound disabilities among all the children in that study and he also displayed the lowest level of complexity and frequency of communication of all the children. The child selected for the third study was Bibbi, a 2:10 year old girl who was atypical according to the group pattern. She had lower scores in her communication ratings than could be expected from her scores on disabilities.

The two case studies share some general features regarding data collection and research approaches although they differ in the methodology of data analysis. For the boy in the second study as well as for the girl in the third study, demographic data on their disabilities and descriptions of their use of communication modes were picked out from the interviews made in the first study. For each of the children, one of the video recordings from the earlier study was selected to be re-analysed with a different approach for analysing the communication. The recording selected was a video recording that was typical of that child’s interaction with the caregiver, i.e. the one that showed a communicative rate and complexity closest to the average score for all recordings for that child (7 and 10 recordings respectively). The videotapes were observed and the behaviours of the child and the caregiver were transcribed as they appeared in sequential order. A second observer was used to independently check the transcription against the videotape. In the second study, the observer agreement was 0.92 for child behaviours and 0.98 for caregiver behaviours. In the third study it was 0.94 for child behaviours and 0.97 for caregiver behaviours. An inductive analysis, involving visiting and revisiting data, construction and reconstruction of relationships, identification of patterns, themes and trends was made by the author and written down as a detailed description of every step in the analytical procedure, also including matrices, flow charts and calculations. This description was then submitted to a second reviewer to verify findings and conclusions before it was summarised in a narrative description.
As a theoretical and conceptual framework for the analysis, system theory was empirically tested in both studies. The approach was the same in the second and the third study, to inductively analyse the communication process between child and caregiver in terms of what they do respectively (behaviours) and what function it serves (creation of a meaning) in their interaction, although for this purpose different aspects of system theory were used in the two studies. In the second study, a system theory perspective on human communication developed by Fogel (1993a, 1993b) was used to analyse the dyadic interaction with regard to the key concepts of co-regulation, consensual frames and system dynamics. In the third study, the analysis approach built more on general system theory and chaos theory (Guess & Sailor, 1993; von Bertalanffy, 1968). Central concepts were open systems, system elements and how they serve as attractors and control parameters.

Mixed methods

The three empirical studies presented above represent quantitative as well as qualitative approaches. As the three studies are linked together by the subjects they can also be treated as different phases of one study conducted with mixed methods. Mixed methods are operationally defined as a combination of qualitative and quantitative approaches in a single study or a multiphase study (Onwuegbuzie & Teddlie, 2003). Mixed methods are traditionally used for triangulation, i.e. to confirm results obtained by one method with results obtained by another method. In this case, the purpose is not to confirm results or conclusions but rather to provide a varied and complementary perspective on communication and children with severe multiple disabilities. The mixing of data analysis methods that is used is a sequential quantitative-qualitative mix where subjects initially are analysed by quantitative data and then further compared, analysed and described in qualitative data (Onwuegbuzie & Teddlie, 2003).

Ethical considerations

In the three empirical studies in this thesis, all the children with disabilities had intellectual disabilities of such a severity that it was not possible to get informed consent about participation. Therefore, parents were asked as advocates. Following the ethical principles, recommended by HSFR (1996), the parents received written information about the project, the aim of the project, how confidentiality and anonymity would be secured and how re-
sults would be presented and used and then signed a letter of agreement. The information was distributed through contact persons who were the supervisors at the pre-schools. To give extended information about each participant in a small sample study, there is a possibility of presenting subject diagnoses. This was not done because children with multiple disabilities often have very individual and specific diagnoses and as they constitute a very limited number in a community it would have made them less anonymous in the final report. The staff at the schools where the studies were made, received oral and written information about the project. In the second and the third study, where the caregiver was part of the study, the involved caregivers orally agreed to participate.

When a videotaped interaction was considered to be informative at lectures for students, researchers, or for other parents and professionals, the parents of the actual child and the interacting caregiver, were contacted and offered an opportunity to see the videotape and then asked for permission to use it in lectures. Following recommended guidelines from Miles and Huberman (1994) for the protection of the people involved, only videotapes of positive and successful interaction have been used in lectures.

Miles and Huberman (1994) raise the question of what each party will gain from having taken part in a project. For the benefits of the participating children, their parents and the involved pre-school staff, parents and staff were offered feedback on their participation when data was collected and analysed. Pre-school staff, speech therapists and parents were invited to a consultation meeting for each child. At this meeting, data and analysis were presented and discussed. They were also offered a communicative intervention program for the child.
General results

The findings from the three empirical studies, supplemented with aspects from the theoretical papers, will be presented in accordance with the three-fold aim of this thesis, which is; first, to describe how children with severe multiple disabilities are communicating in interaction with their caregivers, second, to analyse how different research strategies and methods can add knowledge from different perspectives on communication and, third and finally, to develop models for analysing and describing the process of dyadic interaction involving a child with severe multiple disabilities.

How children with severe disabilities are communicating in interaction with their caregivers

There are three sets of factors that have an impact on how the child with severe multiple disabilities communicates in dyadic interaction with the caregiver. One set of factors is related to the child and consists of certain properties of the child. Another set of factors is related to the environment. Environmental factors can be divided into factors within the physical environment, for example setting conditions, and factors within the social environment, for example caregiver behaviours. In the first study (publication I), factors related to the child as well as factors related to the setting were studied. The role of the caregiver was not investigated in this study. In the second and the third study (publications IV and V), where the communicative process was studied as a system, factors related to the child as well as factors related to the caregiver and the setting were treated as system elements. In the first study, relationships between factors were displayed as statistical relationships between variables, and in the second and the third study they were displayed as timely or contextual relationships between system elements that formed the process.

Group pattern and individual performances

The child related factors that are investigated in this thesis are physical attributes related to type and severity of disability, such as functional use of cognition, vision, mobility and motor manipulation skills. As found in the first study as well as in previous studies (Granlund & Olsson, 1987; Granlund et al., 1991), there are statistically significant relationships be-
between these kinds of personal characteristics and use of the communicative functions; behaviour regulation, joint attention and social interaction. However, an analysis of how the individuals corresponded to the group pattern showed that in three out of four significant relationships one to two of the nine children deviated from the group pattern. There were children who performed better in rate of use of a certain communicative function than could be expected from their personal skill as well as the opposite. Furthermore, when two children were matched with regard to their disabilities they could differ quite a lot in their use of communicative skills, rate as well as level of complexity. When frequency of use of different levels of complexity of communicative behaviours were registered, all but the two most advanced children, the two who could use combinations of words or signs, mostly used a less advanced level than what they could perform at best. This means that a child who could point at objects and use specific clear signals to show intent or reach for something while looking at the caregiver, seldom used these skills, but instead more frequently communicated by only reaching for the object without looking at the communicative partner or even by natural reactions such as blinking, jerking and so on. It was also apparent that children with similar profiles of disabilities could differ in the level of complexity that was used at best and what was used most frequently. Clearly there were other factors than those related to profile of disability that interacted with frequency of use of communicative functions as well as with how complex communicative behaviours these children used. It was also obvious that only by focusing on an individual as an entity and by following that individual through the variables was it possible to get a holistic-interactionistic view of the person that might give more clinically relevant information for interventions. However, the in-depth description of the three children did not explain why one child was typical in relation to the group pattern and why the other two were atypical. Quite clearly there are other factors, besides those investigated, that influence the communicative outcome.

**Setting conditions and communication**

The impact of the physical environment was, in the first study, assessed as the child’s performance in two different setting conditions. When the children were observed in two different setting conditions it was evident that the different communicative functions were used at quite different rates according to setting conditions. Although joint attention was the most used function by all children in both settings, there was an obvious difference
between the two settings. In the mobility setting, where objects and communication partner were out of reach, each child used more social interaction than in the other setting. In the manipulation setting, where objects as well as partner were close, each child used more joint attention than in the other setting. Contrary to the findings of relationships between disabilities and communication this group pattern proved to be valid for all the subjects within the study. The third communicative function, behaviour regulation, did not show any particular pattern. For some children this function was mostly used in one of the setting conditions while for other children it was mostly used in the other setting condition, and for some children behaviour regulation was evenly distributed between the two setting conditions. Although all children conformed to the group pattern, there were great individual differences. While some of the children had a very high percentage of use of a specific communicative function designated to one of the setting conditions, other children had a more even distribution of use of functions across the two settings. These differences could not be explained by the child characteristics related to disability.

**Dyadic interaction – the communicative process**

In the second and the third studies, the communicative process during the play sessions was regarded as a dynamic system or a continuous process system. The basis for expressing the process as a system was arrived at by defining the task of the system, which in these cases was the dyadic interaction in the play session. The dynamics of the system were revealed by the continuously changing process, although the system task kept the system moving in a certain direction. The direction of the system movements and what caused these movements was analysed by examining what kinds of elements were part of the process and the relationships between those elements. The elements that were part of the system were, first of all, the behaviours of the child and the behaviours of the caregiver. But objects that the child and caregiver interacted with and events in the same room, but outside the dyad, seemed to have an impact on the communication process as well.

It was revealed that both partners contributed and also influenced each other in such a way that it was not possible to depict who was a sender and who was a receiver of a message. When the relationships between the behaviours of the child and the behaviours of the caregiver were analysed in relation to each other in the second study, it was obvious that what one of them did have an immediate effect, as well as a more long term effect, dur-
ing the observed session, on what the other person did. In studying their co-regulation, that is, how they altered their actions with respect to the actions of the partner, it was, for example, noted that the caregiver’s questions or comments about a toy or an event were closely linked in time to the child’s eye or hand movements towards the same target. In some instances the match was so close in time that it could be said to have an interactional synchrony. In other instances, it took some time for one partner to alter the focus to correspond to that of the other partner. Another kind of matching was when an abrupt movement from the child was matched by an exclamation from the caregiver, i.e. with another behaviour modality but with the similar intensity. The co-regulation also meant that by time, during the session, the caregiver more easily could adapt to the child when she knew what to expect. Through co-regulation the child and the caregiver came to an understanding of each other, a sort of agreement on what the communication was about and they could construct consensual frames. These frames were depicted as a shared focus that was interpreted by the direction of their behaviours, for example if the child moved his hand towards a toy and the caregiver commented on the toy. Seven topics for such consensual frames were found, of which some were hierarchically ordered. There was an encompassing but unspecified frame of communication, that is, when their behaviours showed a more or less conscious agreement about the whole situation, sitting together and paying attention to each other’s behaviours. Mostly, however, they were more specific about what the communication was about and they constructed frames around an object or an activity. The hierarchical order of consensual frames showed that the communicative interaction between this child and his caregiver could be viewed as a process of searching for meaning and for increased specificity of what they communicated about. The dynamic process of searching for meaning and increased specificity was displayed with the frames as links in a chain. The chain consisted of varying frames involving a toy piano, interruptions to other frames, or no frame at all for a moment, until they reached the final goal for their play activity, to listen to the piano playing. When this was obtained they started the process again and built a new chain of frames, altogether four such chains.

In the third study, it was also apparent that what one of the partners did had an effect on the other person. In this study the analysis of the communicative process was centred on investigating what elements or sets of elements in the system were influencing the system and serving to keep the system oriented towards its task. It was revealed that when new elements were introduced, or relationships or changes in relationships between the
elements occurred, the system went through qualitatively different phases that could be regarded as phases of, more or less, instability or stability. Through the whole play session, eight such phases were displayed. The elements that were displayed as having a relationship and forming the system were some of the child behaviours, some of the caregiver behaviours and the toys. The child behaviours were; turning away from the caregiver with the toy, touching the hands of the caregiver, showing engagement (by breathing heavily), turning to the caregiver while having the toy (as an invitation to the caregiver to play or to get help). Caregiver behaviours were; touching the child, offering and requesting the toy (as an attempt to a give-and-take game), taking the toy from the child in a break in the child’s play with it, moving to the other side of the child (the one that the child was mostly turned to, and where the caregiver then remained for the rest of the session), hiding the toy as a hide-and-seek game (either in her own hands or in the child’s clothes), jingling with the hidden toy, giving attention to other activities in the room. There were two different toys, a soft textile cube with a bell inside and a plastic key ring. Some of the elements lasted over several phases, were gone for some phases and could then return again. If they had not been in the system before, or for a while, upon entry or re-entry they caused a change in the system, thus acting as control parameters, that is the primary agent for a transition into another phase. Although, the shift to a new phase caused moments of instability in the system before it gained a new stability, the process of communication never broke down completely. The partners’ interest in the toys and in each other as well as the quality of the toys were found to be the attractors, that is, the set of elements or relation between elements, that served the function of keeping the system moving on in a certain direction.

The supplementary effect of different research approaches

Communication has been studied from two different viewpoints, first as substance with a quantitative research design, and then as process with a qualitative research design. There are different kinds of causal questions that give raise to different research designs. In quantitative research the interest is in whether and to what extent variance in x causes variance in y. In qualitative research the interest is in how x plays a role in causing y, i.e. in the process that connects x and y (Maxwell, 1996). When communication is regarded as a substance it is the content, it components and how much of it, that is of interest, as in the first study (publication I). The components
are regarded as discrete units and interrelationships between components are investigated as linear and one directional relationships between two variables at a time. However, when communication is regarded as a process, it is multiple relationships between components and the dynamic changes between relationships in a mutual transaction that is of interest, as in the second and the third study (publications IV and V).

**Communication studied as substance**

When communication was studied as a substance, it was studied as a relationship between discrete units or variables. With reference to Magnusson (2003) the variable-based approach, used in the first part of the first study, shows interrelationships among variables that can be used to make inferences about how the variables function within individuals and in accordance to setting conditions. In this study, the variable approach was an efficient starting point. It gave an overall view of the targeted group and also indicated patterns that could be further investigated at an individual level. However, looking at single relationships between single variables does not give an understanding of the functioning of a specific person where multiple variables are operating at the same time. The finding, for example, of a statistically significant relationship between cognition and use of joint attention, and another relationship between vision and use of behaviour regulation, does not tell anything about how a specific child with a combination of intellectual disabilities and vision disabilities is using his or her communicative skills. The intermediate part of the first study, which identified the individuals who had profiles that were typical or atypical in relation to the group results, showed that a child could conform to the group results in one aspect but deviate in another. Explanations of why this is so cannot be derived from the results. The assessment of communicative form, that is mode and complexity, results in knowledge about what a child used mostly and what a child used at best. However, there is no information regarding under which circumstances a child used less complex expressions than he or she was capable of. The finding of a similar impact on all of the subjects, as a result of the setting condition, did not explain why some children conformed closely and others just slightly to the group results. When a single individual is studied, as in the third part of the first study, all the factors that are relevant for that person can be put together and give more person specific and clinically relevant information. Still, looking at specific factors does not give information about how they are related to each other and there is a need for a person-pattern analysis (Magnusson, 2003) that can
give a holistic perspective on the person and a research methodology that brings complexity and multidimensionality into the analysis (Granlund & Wilder, 2006).

**Communication studied as process**

When communication was studied as a process the research task was opposite to studying it as a substance. It was not pieces that had to be put together but rather a wholeness that had to be understood from the relationships between its parts and this was done with the help of system theory as a framework. In system theory it is implied by the term equifinality, that there are many different processes that can lead to similar outcomes (Fogel, 1993b). Therefore, an inductive approach had to be applied. While the deductive approach in the first study had pre-formulated variables to investigate, the inductive approach allowed new variables or factors to emerge and also new relationships between them to be found.

In the first study, the communicative form, i.e. what behaviours are used, was regarded as personal instruments for communication. One of the first findings in the inductive analysis in the second and the third studies was that, even if an activity could be observed as produced by one of the partners it did not solely belong to that person. It could be timely or contextually related to the activity of the other person, to objects and to other events in the environment. Each one of the partners had his or her own instruments, that is access to certain communicative forms and level of complexity, but the use of the instruments was related to the other partner and the context, thus forming relationships between system elements. In the second study, these relationships were displayed as co-regulation that had the function of creating a mutual meaning. In the third study, the relationships between child and caregiver behaviours were regarded as control parameters that had the function of moving the process in a certain direction. In both the second and the third studies, it was revealed that a behaviour can have multiple functions and must be interpreted in relation to other factors in the context.

Although the use of communicative functions, which were investigated in the first study, was defined depending on how an activity from the child was responded to by the caregiver, the communicative functions were treated as produced by the child. In the second study, the creation of meaning was regarded as a co-construction involving both partners and resulting in consensual frames. Also in the third study, the caregiver behaviours and child behaviours together formed a meaning that gave the process a differ-
ent character during different phases. The changing of consensual frames in
the second study as well as the process of moving through different phases
of stability and instability in the third study are two different applications of
system dynamics.

Models for analysing and describing the process of
dyadic interaction involving a child with severe multiple
disabilities.

A model of transactional interaction between child, caregiver
and setting condition

As revealed in publication II and VI, there are several aspects that have to
be taken into consideration when the dyadic communication is to be ana-
lysed. Many of these aspects are already discussed in the former sections
about the child and about concepts. Here they will be put together in a
model of how complex relationships between multiple influences affect the
dyadic communication between a child with severe disabilities and the
caregiver. There are the two partners involved, as well as the situation or
setting, represented as three circles in Figure 2.

![Diagram of influences on dyadic communication](image)

Figure 2. Influences on dyadic communication

Each circle can be regarded as an open dynamic system that can be affected
by and affects other systems. The transactional interaction between the
three systems in Figure 2 is depicted by the overlapping of the circles. Cir-
cle A illustrates the child. The child’s level of development and certain per-
sonal attributes affects the child’s psychosocial skills. The child also brings
into the communicative interaction, former experiences of other persons and situations. In circle B, there is the caregiver, who has his or her personal attributes, such as age and skills but also education and former experiences. Besides these personal characteristics, each person also brings into the actual interaction a set of momentary factors such as level of alertness, personal desires and needs of the moment, and a specific state of feelings that also affects the interest in the other person and in the whole interaction situation. Circle C represents the setting in which the interaction takes place. The setting is characterised by certain conditions as, for example, the light, the sounds, the objects and the positions of persons and objects. Also the surrounding environment that is not directly involved, like other persons and events, may affect the dyadic interaction.

It is apparent that there are numerous factors and relationships between factors within each of these systems. However, there are only parts of the systems that are of relevance for the interaction between them at a certain moment, which is shown by the partial overlapping of the circles. Sections D and E illustrate that there might be setting properties that are of importance only for one of the partners, for example, if the child notices a sound that the caregiver does not notice or if only the caregiver knows that there is an alternative toy in the box to play with. In the same way, only some of all the characteristics of the persons and the relationships between those factors are of importance for the communicative interaction between them as illustrated by section F. In this section, a part of the setting is shared by the child and the caregiver and it is only this part that they can communicate about.

When analysing and describing the dyadic interaction, there are three main challenges. The first is to know what factors and relationships between factors within the interacting systems are of relevance for the communicative interaction. That is, how to choose what to analyse and to describe. Many of the personal factors influencing the interaction are internal phenomena that have to be interpreted from overt behaviours, that is, what the child does and what the caregiver does and relationships between their behaviours. The next challenge is how to validate the relevance of different factors, i.e. to show how they contribute to make a meaning. The third challenge is to describe the dynamic process of the communicative interaction, that is, to make a reliable description of the flow and changes of influences of different factors and relationships between factors during the process. To meet these demands, it is suggested in publication III that the communicative interaction, per se, (section F in Figure 2) be treated as a dynamic system affected by the other systems; the child, the caregiver and the setting
conditions. In the second and the third studies the use of a system theory approach in analysing the communication between child and caregiver resulted in models of the dynamic process.

**Consensual frames**

The attempt from both partners to create and to specify a meaning was in the second study (publication IV) illustrated as a model of hierarchically ordered consensual frames with the shaded frames indicating a main theme for the interaction (Figure 3).

**Figure 3. Hierarchical order of consensual frames (Olsson, 2004).**

This model of how child and caregiver behaviours can be related to each other and to the context meet the first two challenges stated above. How to choose what to analyse and what to describe is evident. All behaviours are regarded as having some kind of intent although the person himself might not be aware of his or her own intentions and all behaviours are considered to have a potential communicative value. Therefore all notable behaviours are included in the analysis. The task is then to find the frames. A frame is created whenever there is any kind of relationship between the behaviours of the partners, either timely or contextual, that can be interpreted as having a meaning. As it was not possible to decide to what extent the child was aware of his own intentions and which of his behaviours were intentionally interactive, the extent to which the caregiver assigned a meaning to them was decisive for determining whether communication was occurring. Communication was an enveloping frame and within it more specific frames were further elaborated, as there was such congruence between the behaviours of the child and of the adult to allow a shared focus to be as-
sumed. This shared focus could be regarded as the topic for the moment. Each frame was defined in terms of child and caregiver behaviours and with reference to the transcription as a validation of how they contributed to make a meaning. Fogel (1993 b) states that higher and lower orders within the same system are the natural result of system dynamics. The model serves the function of illustrating how an essential part of the communication process is the negotiation about a meaning that gives rise to the hierarchical order of frames.

*The dynamic process*

The second model constructed in the second study was a model of how the consensual frames changed during the dynamic process of communicating with the shaded frames showing the main theme for the interaction (Figure 4). In order to map the process, the whole play session was divided into episodes of negotiations. An episode of negotiation was defined as starting when one of the partners did something to which the other could react and ended either when the partners reached some kind of consensus, gave up, or when there was a very distinct shift of focus. Each episode can be found in the transcription and thereby the model meets the above challenge as how to make a reliable description of the flow and changes of influences of different factors and relationships between factors during the process.

The process was depicted as links in a chain of searching for meaning and for increased specificity of what they were communicating about. Such a chain can consist of different frames within a main theme, interruption of other frames outside the theme, or no frame at all until the partners reach a goal for their communication. In the second study the core frame, “listen to the piano playing”, was interpreted as the goal for the dyad. However, this was probably not the only goal or not even the most important one because they could easily have reached it faster and many more times during the play session if the caregiver had taken more initiatives to do so. The process and the social activity of co-constructing consensual frames seemed to be as important and had a value in itself as a mutually rewarding communication.
Figure 4. The dynamic process of dyadic communication (Olsson, 2004).
System stability and instability

Another model of the dynamic process was created in the third study (publication V), where concepts from general system theory were used to analyse the changes of the process (Figure 5). Contrary to the models in the second study, not all of the behaviours of the child and the caregiver are included in this model. In this case, the target for the analysis was to find out what elements of the system caused changes in the system and what elements served to keep the system oriented towards its task. When the transcription of the timely order of all the observable elements, behaviours and objects and relationships between them, was examined, the examination resulted in the identification of qualitatively different phases in the process. The nature of a phase and its demarcation from other phases was examined by analysing what could have caused the change at a certain point and what served to gain a new stability in the system. This was how factors and relationships between factors, that were of relevance for the communicative interaction, were chosen and could only be done by observing the videotaped interaction again or by careful examination of the transcription. The elements that are displayed in the model (Figure 5) are elements that at some point in the process act as control parameters, i.e. the primary agent for a transition into another phase. By supplementing the figure with a description of what is going on in each phase, this model meets the challenge of showing how they contribute to make a meaning and to show the flow and changes of influences of different factors and relationships between factors during the process.

In summary, the three empirical studies demonstrate how the communication between children with severe multiple disabilities and their caregivers are influenced by the disabilities of the child as well as by setting conditions and the activity of the caregiver. While the results from the first study show differences and similarities between children with severe multiple disabilities, the results from the second and the third studies show that dyads can find strategies to have a meaningful and mutually rewarding communication. Together the studies demonstrate the complexity of communication and that different research approaches are complementary and that different models can be used to analyse and describe the communicative interaction. Although the models presented need further testing on many different cases of dyadic interaction they meet the needs proposed by McCollum and Hemmeter (1997); to study unique interaction strategies within unique dyads to gain information about the character of functional dyadic communication in dyads involving children with disabilities.
<table>
<thead>
<tr>
<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
<th>Phase IV</th>
<th>Phase V</th>
<th>Phase VI</th>
<th>Phase VII</th>
<th>Phase VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver touches Bibbi</td>
<td></td>
<td></td>
<td></td>
<td>Caregiver offers - requests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiver offers or requests</td>
<td></td>
<td></td>
<td></td>
<td>Bibbi turns away with the toy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bibbi turns away with the toy</td>
<td></td>
<td></td>
<td></td>
<td>Caregiver takes the toy from Bibbi in a break</td>
<td>Caregiver takes the toy from Bibbi in a break</td>
<td>Caregiver takes the toy from Bibbi in a break</td>
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<tr>
<td>Caregiver takes the toy from Bibbi in a break</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Caregiver moves to the other side of Bibbi... and stays there</td>
<td></td>
<td></td>
<td></td>
<td>Caregiver hides the toy in her hands once &quot;Hide-and-seek&quot; – play…</td>
<td>Caregiver hides the toy in her hands once &quot;Hide-and-seek&quot; – play…</td>
<td>Caregiver hides the toy in her hands once &quot;Hide-and-seek&quot; – play…</td>
<td></td>
</tr>
<tr>
<td>Caregiver hides the toy in her hands once &quot;Hide-and-seek&quot; – play…</td>
<td></td>
<td></td>
<td></td>
<td>...and jingles with the hidden toy hides in the trouser leg of Bibbi</td>
<td>Bibbi has the toy and turns to the caregiver (inviting)</td>
<td>Bibbi has the toy and turns to the caregiver (inviting)</td>
<td></td>
</tr>
<tr>
<td>Bibbi has the toy and turns to the caregiver (inviting)</td>
<td></td>
<td></td>
<td></td>
<td>Bibbi touches the hands of the caregiver</td>
<td>Bibbi touches the hands of the caregiver</td>
<td>Bibbi shows engagement</td>
<td>Bibbi shows engagement</td>
</tr>
<tr>
<td>Bibbi touches the hands of the caregiver</td>
<td></td>
<td></td>
<td></td>
<td>Bibbi shows engagement</td>
<td>Bibbi shows engagement</td>
<td>Bibbi shows engagement</td>
<td></td>
</tr>
<tr>
<td>Bibbi shows engagement</td>
<td></td>
<td></td>
<td></td>
<td>a cube with a bell plastic key ring</td>
<td>the cube again</td>
<td>Bibbi still has the key ring</td>
<td></td>
</tr>
<tr>
<td>a cube with a bell plastic key ring</td>
<td></td>
<td></td>
<td></td>
<td>Caregiver attentive to other things</td>
<td>Caregiver attentive to other things</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5. Phases in the play interaction process and occurrence of different elements
Discussion

The kaleidoscope metaphor in the title indicates an endeavour to look at different patterns of communication formed by different ways of studying communication. When the child was in focus there was a pattern of interaction between child characteristics and use of communicative functions and when the environment was in focus there was a pattern of interaction between setting conditions and use of communicative functions. Finally, when the focus was on the communicative process, the transactional interaction between the child, the caregiver and the environment formed other kinds of patterns. A broad view on communication is in line with the International Classification of Functioning, Disability and Health (ICF) stated by World Health Organization (2001). According to this classification, limited functioning as well as interventions for an increased functioning can be classified across four dimensions: (1) body function and structure, (2) activity, (3) participation, and (4) the extent to which environmental factors serve as barriers or facilitators. Within the three empirical studies and the three discussion papers that are included in this thesis all four dimensions are addressed. However, although knowledge gaining, the broadening of this knowledge by use of different research approaches and developing models for analysis are appropriate research aims, these aims can never be a final goal. The final goal must be to provide evidence for good practices. Evidence-based practice has been defined as “the integration of best and current research evidence with clinical/educational expertise and relevant stakeholder perspectives to facilitate decisions for assessment and intervention that are deemed effective and efficient for a given direct stakeholder” (Schlosser & Raghavendra, 2003, p.263). Therefore the discussion will be concentrated around how the results from the empirical studies along with the theoretical aspects presented in this thesis can contribute to evidence-based practice. While the small sample size in the studies limits the appropriateness to generalise the results, the extensive theoretical overview of central concepts, on the other hand, makes it possible to integrate the results with theories on communication.

Methods used in empirical studies

The use of different research designs, a deductive and mainly quantitative design in the first empirical study (publication I) and then an inductive
qualitative design in the second and third empirical studies (publications IV and V) represent two completely different ways to treat the data, i.e. the videotaped interaction sessions. According to Maxwell (1996) the first design is essentially linear in the sense of being one-directional sequences of steps following a traditional and pre-established plan for carrying out the study, while the second design is an iterative process of going back and forth between the different components of the design; purposes, conceptual context, research questions, methods to analyse data and relationships and, validity control. Both kinds of designs have their values and although the studies in this thesis went from a deductive approach to an inductive approach, it can work in reverse. Findings from an inductive study give rise to hypotheses that need to be further tested deductively, which also means that the hypotheses that have been evolved in the two inductive studies in this thesis can form a basis for future deductive analysis.

According to Miles and Huberman (1994) there is a difficulty in verifying qualitative studies because researchers do not report clearly on their methodology as there are no shared conventions for doing so. In the first empirical study (publication I), measurements and instruments were validated in former studies and reliability was checked by established methods of using an independent observer and calculation of inter-observer agreement. The group results were also validated by evaluating individual congruence with, or deviations from, the group pattern. However, as Maxwell (1996) points out, validity testing in qualitative research cannot be reduced to mechanical procedures, it is more complex and many times consists of a number of different methods for identifying validity threats. In the second and third empirical studies (publication IV and V), a second opinion from an independent reviewer of the analysis material was used to validate an extensive description of all the steps in the analysis procedure. As also indicated by Maxwell, the theory that is held of the phenomenon to be studied, influences what you see as relevant. In the second and the third empirical studies, the way data could be explained by the system theory framework thus can be regarded as a validity check. The third way to check for validity is to provide data that are detailed and complete enough for the reader to draw conclusions from, as was done in the second empirical study (publication IV) where the complete transcription of the observations was provided. Another way, which is recommended in qualitative studies, is member checking, i.e. feedback about the data and conclusions from the people studied. This was not done in the two qualitative studies in this thesis because of the time delay of a couple of years between the video recording of the interaction session and the qualitative analysis, which causes
difficulties for the caregiver to tell how she interpreted the child at that time. Besides, there were two persons involved, the child and the caregiver, but only the caregiver could have given her interpretation.

For the researcher, the straight walk through different steps using well established and approved methods of data analysis, as well as procedures for reliability and validity checking in the quantitative design, is definitely less time consuming and less space consuming in the final report of the study than the constant decision making and trying out of different paths of analysis and the complexity of validating the findings in the inductive qualitative design. A problem today is that although qualitative research is requested, the quantitative research design is, to a high degree, the norm when pages are counted in publication of a study. This forces the researcher to cut down on information, which may result in validity being called in question not only for the specific study but for qualitative research in general. However, as a researcher and practitioner and although I plead for a multifaceted view on communication and use of mixed methods, I found the tracking between data, theory and context in the qualitative studies, as well as the discussions with a second reviewer, worth the time spent as it gave an in-depth understanding of dyadic communication that could be used in practice with other cases.

Gained knowledge on communication between child and caregiver as an evidence base for practice

To begin with, how communication is defined is an essential starting point for investigations as well as for assessments, interventions and finally for practice. The definition proposed was that: Communication occurs when messages are transmitted between persons, which happens when the behaviour of one person is assigned meaning or intent by another person. The Theory of Relevance that is discussed in publication II verifies the utility of this definition, especially when the communicative act involves a person who does not use symbolic communication. Theory of Relevance (Sperber & Wilson, 1986) proposes that every act of communication can involve two dimensions, the linguistic encoding and decoding, and the inference. Inference is made about the meaning and the intent. The intent can be interpreted as retrospective, there is a cause of the behaviour, or as prospective, there is a goal to be obtained by the behaviour. Figure 6 illustrates the path along those dimensions until a consensual frame is created.
The Theory of Relevance can be regarded as linking the two approaches, the linear model and the dynamic process system together. Within the framework of the linear model, an interpretation will be more or less valid as it approximates the real meaning. In the dynamic process model, because meaning is continuously co-constructed, the validity of an interpretation must involve considering how participants, influenced by the context, come to assign meaning to the behaviours of each other. Meaning can never be derived from one-to-one mappings of words and their referents, because each utterance is capable of being interpreted in many different ways. There is always a balance between what is implied and what is explicitly and linguistically encoded and the less linguistically encoded information the more inference is needed. A shared code, such as the use of formal symbols, provides faster ways to a consensual frame, but there can also be informal shared codes of more personal patterns of behaviours as the partners learn to read each other. The balance between the coding and the inference varies between individuals and situations. Communication includ-
ing persons with limited access to formal linguistic codes is always weighted towards the right path in Figure 6.

As the inference plays such an important role in communication between children with severe multiple disabilities and their caregivers, it must also be taken into consideration in assessments. That the inference made by the caregiver was taken into account when use of communicative functions was assessed in the first study (publication I), was probably decisive for the results. In contrast to other studies, where only intentional communicative child behaviours were assessed (e.g. Olgetree et al., 1992), the results from this study showed that the joint attention function was the most frequently used function by all the children, despite severe multiple disabilities, just as found by Ogletree et al., in typically developing children with communicative behaviours meeting the criteria of intentionality. Most probably, the context in the first study played an important role for how the behaviours of the children with disabilities were given a meaning and responded to by the caregivers. The manipulation setting gave rise to more joint attention communication than did the mobility setting, which could be a consequence of more apparent environmental cues in the manipulation setting. Toys and partner were within reach and it was easier for the partner to make inferences about the child’s focus of interest. When toys and partner were out of reach in the mobility setting condition, a great deal of the communicative interaction had a social interaction function. In practice, this means that the setting in which assessment takes place might be decisive to the results of the assessment. It also indicates that to enhance a varied use of communicative functions there is a need for varied settings.

In the second study (publication IV), it was shown how the child and caregiver together created consensual frames. The most unspecified frame was a consensus about just being together with no further specification of a topic for the communication. Within this encompassing frame they constructed more topic specific consensual frames, for example about an object or an activity. The use of different communicative functions in different setting conditions can be related to the construction of different kinds of consensual frames by looking at how inferences are made. Inferences are built on evidence, that according to professor William Rawlins (personal communication, July 2000), can be found on different levels. The first level is evidence of perception of perception, i.e. to find some behaviour that can be interpreted as ‘I see you seeing me’. This kind of interpretation gives a social interaction function and could contribute to the enveloping frame of communicating. Most probably there was a greater need for evidence of perception of perception in the mobility setting, with the partner at a dis-
tance, than in the manipulation setting, thus resulting in more social interaction in this setting condition. The next level is evidence of intentions, where behaviours are given an “in order to” or “because of” explanation. At this level the search for a more specific meaning starts, resulting in the co-creation of more topic-related consensual frames. It can be anticipated that the proximity of partner and toys in the manipulation setting condition provided more evidence of intentions with a joint attention function compared to the mobility setting. The third and final level is an evidence of shared code. With time, personal patterns can develop into an informal shared code and, with a familiar communication partner, serve the same function as linguistic codes and thus decrease the amount of inference needed. This was exemplified in the third study (publication V) when the child and caregiver had a repeated hide-and-seek play. A very distinct sound or something that is so obvious or outstanding in the context that it makes one of the partners assume that the other person notices the same phenomena, can also serve as a shared code for the moment. This was for example revealed in the second study (publication IV), when the child and caregiver quickly and easily co-created a consensual frame around a very pronounced event or a sound. In all three empirical studies it was shown that the willingness of the caregivers to accept all kinds of behaviours as communicative kept the dyadic interaction moving on.

A good communicative outcome is not always equal to a more frequent use of formal symbols and signals. The second and third studies (publication IV and V) showed, as illustrated in Figure 6, that although there is sometimes a long process before a consensual frame is reached, the way towards it is part of the meaningful interaction. A desired outcome of communicative intervention for a person with severe multiple disabilities might then be a mutually rewarding interaction rather than the development of more complex skills, per se. This is also what parents of children with multiple disabilities report as successful communication (Wilder & Granlund, 2003). Communicative intervention with those persons should thus focus on participation and interpersonal interaction that can be dyad unique, rather than on individual performances related to normal development.

Different research approaches give different evidence bases for practice

As shown in the three empirical studies (publication I, IV and V) research on children with severe multiple disabilities and their communication with caregivers can be conducted with quite different focuses. When the same
child was investigated with different approaches it was obvious that different ways of studying communication resulted in quite different views on the communicative ability of a single individual. When a variable approach was applied to study communicative skills related to child characteristics (publication I), the boy Ian, for example, showed a limited range of communicative behaviours and an overall low rate of those behaviours in use of different communicative functions, which was just as expected with regard to the very severe multiple disabilities that he had. However, when one of the video recordings, selected as being typical for that child, was reanalysed in the second study (publication IV), this time with a dynamic system approach to investigate the communicative process, it was revealed that the child and the caregiver had an ongoing interaction for about ten minutes, where they managed to communicate within several topics, make short shifts to other topics but still keep on the track of a main theme and construct hierarchically ordered consensual frames. It is apparent that different research approaches will result in different evidence and thus also form different bases for practice as shown in Table 3.

Communication was first studied as substance, i.e. as consisting of discrete units and linear relationships between those units and other variables (publication I) and analysed at three levels. The results from the molar (group) level showed group patterns, which in this case meant that certain relationships between use of communicative skills and child characteristics (cognition, motor and vision skills) as well as setting conditions were revealed. Group designs are useful as they allow predictions of group behaviours, which is important in the development of coherent theories of human behaviour (Light, 1999). Group patterns are also useful when there is a reason to compare different groups, which has been common in communication research (e.g. by Ogletree et al., 1992; Mar & Sall, 1999). However, when there are multidimensional relationships the results must be interpreted with caution. In the study in publication I, the results did not tell anything about the interrelationship between different disabilities and how the complexity of multiple disabilities may affect the communication. The challenge of analysing the impact of multiple influences has been addressed by several researchers (Granlund & Wilder, 2006; Light, 1999; Wachs, 2000). To address this question, Granlund and Wilder (2006) give examples of research methods to handle complexity, multidimensionality and heterogeneity among research subjects and small numbers of participants.
TABLE 3. Evidence-based practice derived from the three empirical studies

<table>
<thead>
<tr>
<th>Communication studied as substance (The first study)</th>
<th>Communication studied as process (The second and third study)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molar (group) level</td>
<td>Intermediate level</td>
</tr>
<tr>
<td>…following variables through a group of persons</td>
<td>…investigating persons congruent or deviating from group pattern</td>
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</tbody>
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...which provides:

- Group patterns
- Validation of the group pattern on single individuals
- Clinically relevant information
- Dyad unique information
- Dyad unique information

...that give predictions of group behaviours...that can be compared to patterns of other groups
...that can be used in a further search for impact of other factors
...that can be used in clinical practice to find the strong and the weak points in specific individuals
...that can assist the caregiver in reading the child and adapting to the child
...that can give indices of at what points and by which means the process can best be affected in a certain direction

...that can be used in:

- assessments of isolated individual skills
- norm referenced goal setting
- interventions aiming at enhancing individual skills
- assessments constructed as analysis of unique dyadic interaction
- goal setting aiming at improving the dyadic competence

When the group pattern in the first study was validated on single individuals at the intermediate level of analysis, one of the interesting findings was that the physical attributes, measured as independent variables, were not enough to explain similarities and differences between the use of communicative skills as dependent variables. Several studies indicate that attributes traditionally used to describe individuals with disabilities by diagnostic or disability labels, provide little predictive value in relation to either the outcome of communication intervention or the frequency of their communication in everyday life (Granlund & Olsson, 1999). Other child attributes,
such as personal features that invite or discourage particular reactions from the environment or the child’s active orientation toward an interaction with the environment as well as caregiver attributes might have been more decisive for the communicative outcome than relatively small differences in physical attributes. According to Wachs (2000), who addresses the problem of variability in individual outcomes: “individual influences, although necessary, can rarely be considered sufficient explanations for variability in human behavioural development” (p. 11). The intermediate level made it obvious that patterns found at group level cannot uncritically be applied at an individual level although they can provide expectations to be tested on single individuals.

The focus on the person at the molecular (individual) level of analysis provided an opportunity to follow single children through the variables and give more personalized information. As stated by Light (1999), this kind of information may be of critical importance in theory building as well as in clinical practice. Understanding a single child’s interaction patterns and the controlling variables is as important as understanding the group results. As a basis for interventions it may give information on what kind of adaptation to the child’s needs and abilities is needed. A weakness in the first study, or in any study that only patterns the child’s part in the communicative interaction, was the fact that the dyadic communicative competence was neglected. Although the use of communicative functions was measured as a result of both partners’ contributions, the caregivers’ part was not analyzed and the results were treated as individual skills. Even if each one of the partners in a dyadic communication has his or her own instruments, i.e. personal skills, the use of these instruments is related to the partner and the context, which explains the variability addressed by Wachs (op cit).

Whether research is focused on the child or on the dyad will have an impact on practice as demonstrated when results from parents’ prioritizing of communicative goals in two different studies were compared (publication VI). When skills related to the child were listed as a priority in a study by Stephenson and Dowrick (2000), there were more goals related to behaviour regulation. By contrast, there were more goals related to joint attention when parents were asked to prioritize interaction problems in a study by Wilder (2000). In both studies, maintaining interaction was highly prioritised, which indicates that the parents in both studies regard communication as a desirable shared activity and which puts the focus on the process and how to maintain a meaningful dyadic interaction.

The focus on the process moved the approach to a system theory approach that was first discussed as a theoretical framework for studying dy-
adic communication (publication III) and then, empirically tested in the second and the third study (publication IV and V). When behaviours were regarded as system elements in relation to other elements and interpreted within a context, an opportunity emerged to consider alternative explanations or other values of certain behaviours. With the inductive approach there was also a possibility to discover system elements that had an impact on the process without any pre-assumptions of what to look for or what to find. The qualitative analysis of what happens, when and in relationship to other factors, also gave another kind of information than the one obtained from a quantification of occurrences. For example, the girl Bibbi, who was one of the three children in the first study (publication I) and who was described in more detail in the individual part of that study, deviated from the group pattern and did not have the frequency of use of communication that could have been expected from her physical attributes measured as cognition, motor and vision skills. When her behaviours were analysed in the third study in the context of the process it was obvious that she had very little interest in using them in play interaction, rather she used them to play by herself. This meant that there were other personal attributes such as her temperament/behavioural style and affective expressions as well as an initial lack of orientation towards an interaction with another person that the caregiver had to adapt to. These kinds of adaptations can only be understood within the context, which means that interventions cannot focus on teaching general partner strategies.

In both studies of the communicative process, it was revealed that dyad unique strategies emerged from the child’s use of his or her instruments for communication and the caregiver’s adaptation to the child and were related to other factors in the situation. In practice, this means that interaction strategies must be considered to be flexible processes based on the caregiver’s ability to read and adapt to the child under different conditions (McCollum & Hemmeter, 1997). McCollum and Hemmeter further emphasise that interventionists must be sensitive to the fact that differences in caregiver behaviours in interactions with children with disabilities may represent functional adaptations made to obtain a mutually rewarding interaction. This brings the caregiver into focus not only as a target for interventions but also as an observer, interpreter and hypothesizer in intervention collaboration.
Communication models as evidence base for practice

As put forward in publication VI assessment methods are part of the intervention. Most formal assessments are derived from group designs and focus on isolated skills, as for example the ESCS (Early Social Communication Scale; Seibert & Hogan, 1982) that was used in the first study (publication I). Even when they are designed to assess the interaction with atypically developing children, formal assessments, in general, are based on theories about communicative development in typically developing children. As has been argued in previous chapters, significant milestones in typical development cannot be a norm when dealing with atypically developing persons. It is also debatable whether research findings from studies of early interaction between children who are normally developing and their caregivers are valid for planning and implementing interventions for persons with severe multiple disabilities (McCollum & Hemmeter, 1997). This excludes standardized tests from the assessment techniques to be used with children with severe multiple disabilities. But, on the other hand, if the assessment is informal it is difficult for the caregiver to draw conclusions. Therefore, there is a need for assessment tools designed to help focus partners on interaction rather than isolated communicative skills, to help partners to generate ideas for goals for intervention, and to help partners to generate ideas for interaction intervention. To date there are just a few formal assessments, presented in publication VI, that are especially developed for dyadic communication involving pre-symbolic communicators. So far there is no instrument developed to assess the communicative process although the models derived from the two empirical studies on communication process can form a basis for such assessments.

When communication was studied as a dynamic system process in the second and third empirical studies in this thesis, there were two different ways to follow the process, first by analysing the co-construction of consensual frames (publication IV) and then by analysing the control parameters that moved the system on (publication V). In both studies it was confirmed that a dynamic process, in order to develop towards a final goal, must be allowed to move through phases of instability. Furthermore it was revealed that it was not as much the single elements in the system as the relationships between those elements and the change of elements and relationships during the process that gave the dynamic. The analysis resulted in three models that can influence practice as well as interventions.

The first model (see figure 3), derived in the second study (publication IV), was constructed to illustrate how the communicative process involved
a search for meaning that resulted in the co-construction of consensual frames. The model shows that there were several different frames connected to the play with a toy piano that were hierarchically ordered, which indicates that this was the main theme and thus required increased specificity. Other consensual frames were constructed whenever something outside the play with the piano occurred that the child and caregiver communicated about, but with no further specification, either because it was clear enough due to inference from strong environmental cues, or because it was less important and would have disturbed the communication about the piano playing. The model further shows that there was an enveloping frame, solely about communicating with no further specification about topic. The hierarchical order of frames can serve to change attitudes towards entering into an interaction with a pre-symbolic communicator. Communication that requires a lot of inferences from the partner may cause concerns about being able to make correct interpretations. It might be obvious that the child wants something but determining what is wanted is difficult. As a result of the ambiguity, the communication partners may choose not to enter into a negotiation about the meaning with a child with severe multiple disabilities. Rather they may neglect or ignore the behaviour of the child, i.e. they do not allow the behaviours to function as an act of communication. The awareness of communicative meaning as something that is mutually created step by step may help to overcome this concern. The model of hierarchical consensual frames allows the partner to commence the interaction at a very general level and it makes it possible to view further moves to more specific frames as a part of the process. The space for negotiation also means that the partners need not agree or fully understand each other to have a mutually rewarding communication.

The second model (see figure 4) in the same study (publication IV), illustrated as a chain with links that consisted of consensual frames, shows how the process of a search for consensual frames moved towards the most specific frame. Despite various intermissions, as a temporary break down of communication, i.e. no consensual frame at all was created for a moment, or just interruptions from other frames outside the main theme, the child and the caregiver repeatedly returned to the main theme and reached the most specific frame, which could be regarded as a final goal, four times during the session. Each of the partners contributed to move the process forward although there were different demands on their contributions. The dynamics of the system can be well integrated with Vygotsky’s (1978) principle of Zone of Proximal Development: when a child can do more with the help of a more skilled person, than he or she can accomplish alone.
The caregiver has to take the responsibility to move the process forward by interpreting the behaviours of the child as if the child had a clear intention, thus consistently organizing a social interaction around different themes. For development to occur, however, the child must be given opportunities to take over the responsibility to achieve the goal and one task for the caregiver is to enable the child to fulfil his or her potential to contribute (Ware & Healy, 1994). This was what happened successfully in the second study, when the caregiver allowed her own behaviours to be organized by the child, e.g., when the child took the lead to return to the main theme after an interruption. It happened with less success when the caregiver reduced her assistance and demanded more specific contributions from the child, e.g., requiring him to use his hand more. In practice this means that in an interaction with a child with severe multiple disabilities the partners must be allowed to experiment within the Zone of Proximal Development even though it momentarily may cause a break in the process. According to systems theory, for a system to develop there needs to be at least temporary instability but the system will work to regain stability and will strive towards a goal, as long as the task of the system is clear (von Bertalanffy, 1968).

The third model (see figure 5) was developed in the third study (publication V). This model shows how the process, at certain points, moves to a new phase of more or less stability and that there are a number of elements that together can act as agents for the transition into a new phase, i.e. control parameters. In the study the play interaction between the child and the caregiver developed from an initial phase where the child was only interested in the toys, not in interactive play with the caregiver, through an interest for the activities of the caregiver, to a clear direction towards the caregiver and an interactive play with the caregiver. In terms of communication there was a communication going on all the time, even when the child rejected the caregiver’s invitations to a shared play, but presumably this was not to be regarded by the participants as a mutually rewarding interaction. That can be assumed to occur when they were both accepting the interaction around the play. It was obvious that it was the caregiver who took the responsibility to move the system in that direction, although it was the relationship between several elements, adult behaviours, child behaviours and the toys, that served as control parameters. The relationship between those elements cannot be chronologically ordered or regarded as plain cause and effect, the relationships are merely a co-existence of some elements in a certain phase and it is these relationships that serve as control parameters moving the system into its next phase. In a discussion of inter-
ventions based on efficacy research, Light (1999) states that interventions have, to date, been based on efficacy research that investigate the effect of one component of intervention at a time, assuming that there is a possibility to piece together the results of these individual studies and illuminate the effects of the entire multidimensional process of communication. However, the ultimate effect of interventions may be much more complex than the sum total of the effects of the component parts of the intervention.
Conclusions

As this thesis consists of theoretical papers as well as empirical studies the conclusions will encompass theory as well as empirical research. From the starting point that communication can be viewed from many different perspectives, like a kaleidoscope showing different patterns depending on how it is turned, follows a humble attitude that each perspective has something to contribute. However, the many turns of the kaleidoscope ended up in conclusions that each pattern that was found had to be interpreted with caution since the validity of each pattern is dependent on how it is used. A simple pattern, as for example linear relationships between variables, is attractive because it is easy to apply and easy to draw conclusions from. However, as revealed in the first study, the simplicity can indicate that there are more pieces that are hidden than are observable. The complexity, on the other hand, that was revealed in the second and the third study, makes the pattern difficult to apply and generalize to other situations or other dyads. The existing variety of research approaches is a positive factor for the future but there is a need to develop and test multidimensional research approaches in order to analyse a variety of interacting variables. The use of system theory has not been applied in previous research as a methodology for analysis but proved to be useful in picturing the complex pattern of dyadic interaction. However, this needs to be further tested and developed to be more easily applied as a research methodology and for use in interventions.

In the theoretical parts, it was argued that the dyadic interaction involving a typical developing child cannot be a norm when the child has severe multiple disabilities. The empirical evidence to support current practices for dyadic interaction between children with severe multiple disabilities and their caregivers is sparse. The system oriented approach, although limited to two dyads and two communication sessions, provided models that should be further tested. It was also argued that traditional criteria for intentional communication are not valid for children with disabilities. This argument was strengthened by the empirical studies that showed that the communicative function as well as the meaning of a behaviour could be viewed as something co-constructed by both partners in the dyad. Intentions are closely linked to functions and when not explicitly coded they are, to a higher degree, assigned by the partner. This also strengthens the fact that communication cannot be regarded as a personal competence, the
competence is within the dyad. The study of the process as a system showed that competence does not mean that a communicative process consists of optimal outcomes all the way through. For the system to develop there must be a shift between system stability and instability and the way to a consensus may have a value in itself. All this strengthens the statement that there is a need for revised theories about communication involving persons with severe multiple disabilities. Further efficacy research where the communicative process is analysed is also urgently needed to guide clinical intervention and best practices.
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