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Video Observations of Dyadic Interaction: Behaviour style of Presymbolic Children

JENNY WILDER

ABSTRACT *Research has shown that the behaviour style of children with multiple disabilities who do not use symbols in their communication affects their interaction with others. This study investigated the patterns of caregiver–child interaction and the relation between patterns of interaction and behaviour style in seven children with multiple disabilities who do not use symbols. Purposive sampling was employed and video recordings of caregiver–child interaction were performed during home visits. The results showed that the children's behaviour style and how easily the children could be interpreted were factors that the caregivers used to monitor the interaction and obtain more frequent periods of successful interaction. By triangulation of instruments the caregivers were shown to be well aware of the roles children and parents had in the dyadic interaction.*

Introduction

There exists a reciprocal and binary exchange between the parts in the family system (Duis, Summers & Summers 1997, Sameroff & Fiese 2000). The family is the major influence affecting the growth and development of children (Lin 2000, Shonkoff & Phillips 2002), and correspondingly the child influences the wellbeing of the family. Thus, it is essential not to separate child and context (Lewis 2000). In interaction intervention, interaction patterns between a child and his/her caregivers must be assessed and intervened with in relation to the family system (McCollum & Hemmeter 1997). This study aims to investigate the patterns for how caregiver–child interaction would present itself for dyads where the child has multiple disabilities and communicate on a presymbolic level. The aim is also to study how a personal characteristic such as behaviour style influences dyadic interaction.

In a communicative situation, parties need to share referential frames and schemas for interaction to be mutual and to function successfully (Fogel 1993). Children who function pre-symbolically are most dependent on their families, and caregivers must be especially sensitive when guiding these children in interaction and social life (Waxman, Spencer & Poisson 1996). To ensure that interaction takes place for a child with multiple disabilities, an

Correspondence: Jenny Wilder, Department of Social Sciences, Mälardalen University, Box 883, 721 23 Västerås, Sweden. Tel: +46 21 103102. Fax: +46 21 101390. Email: jenny.wilder@mdh.se

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interaction partner needs to have knowledge about the child's characteristics, skills, mood, preferences and behaviour style as well as the context. Probably, it is the close caregiver who has this knowledge; also functioning interaction in the form of turn-taking occurs in the daily life for children with multiple disabilities (Wilder & Granlund 2003). Furthermore, as caregivers also function as mediators (Grove, Bunning, Porter & Olsson 1999) it is important to take their general practices, ideas and beliefs into account when investigating interaction (Super & Harkness 1999).

Most experiences of caregiver–child interaction that the child harbours occur in the close environment of the child, in the family (Wachs 2000). Proximal processes denote close interaction between the child and caregiver and take place in everyday life. Niches are defined as stable recurring situations where interaction takes place between at least two individuals (Wachs 2000). The characteristics of the individuals and situations form the niche. These niches can be positive or negative for the child's development. In this way the individual accumulates experiences that are incorporated into his/her mental representations of reality. As such it is always important to take the context into account when considering the development of a child (Wachs 2000).

As described above, the child's development is influenced by the characteristics of proximal processes and niches that are available. The dynamics of interaction between caregiver and child is one example of proximal processes. This process denotes turn-taking between two individuals and is set within boundaries, for example, a mutual focus of interest. It is a spiralling process, which means that the turn-takings do not only go back and forth within the dyad but also that each turn carries something new. It this way, the dynamics in the interaction are developmentally enabling to the parties.

Personal stimulus qualities, in the form of behaviour style and affective expressions, come to influence niche characteristics for the interactions in which the child takes part (Sontag 1996). As such, they influence the interaction in niches, complementing the context. Although children with multiple disabilities are difficult for caregivers to read in interactions with caregivers (Granlund & Björck-Åkesson 1998, McCollum & Hemmeter 1997), studies show that when children with disabilities show an intensive temperament, in other words a more hyper-dominated behaviour style, caregivers find it easier to read the children in interaction (Wachs 2000). This is contrary to results from studies with typically developing children as participants, where the caregivers find it more difficult to handle children who show an intensive temperament (Wachs 2000). Furthermore in an overview of studies, Huntington and Simeonsson (1993) found that behaviour style in the form of temperament was not related to etiology of impairment among children with disabilities.

Earlier studies have found that behaviour styles of children who communicate on a pre-symbolic level are more strongly related to the caregiver-perceived interaction than communicative skills and functional abilities of the child (Wilder, Axelsson & Granlund 2004, Wilder, unpublished report). In

these studies, behaviour style dimensions investigated were: *activity*, *reactivity*, *goal directedness*, *frustration*, *attention span*, *receptiveness to parent/caregiver* and *general tone of body*. Correlation analyses showed that when children measured high *reactivity* they initiated interaction less often. The pre-symbolic children tended to end behaviour less frequently and to decide more frequently the time spent in joint focus when they showed a wide *attention span*. A wide *attention span* means that the child can maintain its attention for a longer period of time. Furthermore, correlation analyses showed that when the children exhibited a wide *attention span* the caregivers could direct the children's attention more often. The dimensions *reactivity* and *goal directedness* were statistically related: high measures of *reactivity* were related to low measures of *goal directedness*. Furthermore, the pre-symbolic children showed low complexity in expressions related to joint attention, especially maintaining joint attention (Wilder *et al*. 2004, Wilder, unpublished report).

Additionally, Wilder *et al*. (2004) used the questionnaire The Child and Caregiver Interaction (CCI) (a combination of items from Granlund & Olsson 1988, Light, MacNaughton & Parnes 1986, Rowland & Schweigert 1992). In CCI, interaction is assessed according to the caregiver's perception of it at present and how they would like it to be. Overall, the results showed that the caregivers wished that the pre-symbolic children would improve interaction related to sharing focus of attention, that interaction would last for longer periods of time and that the parties in the dyads would understand each other better in interaction.

To investigate dyadic interaction qualitatively Wilder and Granlund (2003) studied how caregivers of seven children who functioned at a pre-symbolic level perceived the interaction in the caregiver–child dyad. They found that when detailed questions were asked about dyadic interaction, the caregivers showed that they were well aware of how they acted for and in interaction. In the study, semi-structured interviews, focusing on the perceptions of seven caregivers of the interaction between them and their pre-symbolically functioning children, were conducted during home visits. Results showed that the caregivers perceived a successful interaction to be built up of mutual participation and understanding and that reciprocal appreciation was established. Behaviour style was considered to be a factor that the caregivers used together with knowledge about context and the children's abilities in order to gain an overview and to monitor interaction into more frequent periods of successful interaction. As such two processes occurred in interaction: monitoring and successful interaction. The caregivers felt that they had a leading role in interaction and they were sensitive to the children's behaviour in order to use strategies to promote successful interaction.

These findings provided the background for this study, which used video recordings to investigate further the dynamics of dyadic interaction and their relation to the child's personal characteristics. For this study a qualitative approach was chosen to give a more individualistic analysis, as also earlier findings suggest is more appropriate when studying a target group of

presymbolic children and interaction (Letourneau 1997, McCollum & Hemmeter 1997).

In this context, the dynamics of dyadic interaction are defined as turn-taking and changes in patterns of turn-taking set within the boundary of a mutual focus of interest. The aim was to look for patterns or trends in how the interaction presented itself and also to study the patterns for the relationship between behaviour style and interaction. Research questions were: what do the dynamics in the interaction look like? And how do the dynamics in the interaction relate to the children's behaviour style?

Method

Participants

The participants were the same seven Swedish children with multiple disabilities and their caregivers as in Wilder and Granlund (2003). Five mothers, one father, and one mother and father together participated. All children communicated at a pre-symbolic level, which meant that they communicated by vocalizations, gestures, facial expressions and body language but did not use any symbols, signs or words. The children were 3, 3, 3, 6, 6, 7 and 8 years of age and had different diagnoses, for example CHARGE syndrome, and mental retardation and cerebral palsy in combination. All children lived with both their parents although they had different family situations with a different number of siblings.

With an abilities index the children's functional abilities and communicative complexity were measured (Bailey, Simeonsson, Buysse & Smith 1993, Roll-Petterson, Granlund & Stéenson 1999). The abilities index showed the children to have moderate to profound disabilities in language usage, language understanding, social abilities and cognition. Five of the children had normal hearing, two children had moderate to severe hearing impairment. One child had normal vision while the others had moderate to severe visual impairment. Three of the children were ambulatory and the others were not.

In conjunction with another study, 35 families were contacted by advertisement on the Internet homepage of two disability organizations in Sweden, and 30 families completed that study (Wilder *et al*. 2004, Wilder, unpublished report). All families had at least one child with multiple disabilities and the children differed in behaviour style and communicative abilities (Wilder *et al*. 2004). The children for the present study were selected individually from the above sample of 30 children using strategic sampling. The criteria for the selection were that the children should differ as much as possible from each other in behaviour style, with a range from hypo- to hyper dominated behaviour style. To explore behaviour style the B section of Carolina Record of Individual Behaviour (CRIB) (Simeonsson, Huntington, Short & Ware 1982) was used. This comprises seven items inquiring about behaviour style measuring the levels of *activity*, *reactivity*, *goal directedness*, *frustration*, *attention span*, *receptiveness to parent/caregiver* and *general tone of*

body. These dimensions are measured on a scale ranging from 1 to 9 with 1 indicating hypo/passive behaviour and 9 indicating hyper/extremely intense behaviour.

For this purpose the dimensions of *activity*, *reactivity*, *frustration* and *goal directedness* were considered in more detail. The behaviour style measures for all children were examined and after comparing the 30 individuals' responses a satisfactory sample was found. The children that were selected for this study had unique behaviour styles that ranged from hypo- to hyper-dominated behaviour styles across individuals and across behaviour style dimensions for each individual, and they all differed as much as possible from each other. Nine families were contacted and seven agreed to participate in the study. Two families declined because they did not feel that they had the time or strength to participate. Although these two children had special behaviour styles according to the criteria, the final sample of 7 children still presented a range that was considered to be sufficiently diverse.

In Table 1 the children's behaviour styles are presented. The white cells denote where hypo dominated behaviour style measures occur (1–3), the grey cells denote normal measures (4–6) and the dark cells denote where hyper dominated behaviour style measures occur (7–9). There are two blank cells where data are missing.

The Child and Caregiver Interaction (CCI) questionnaire, a combination of items from Granlund & Olsson (1988), Light *et al.* (1986) and Rowland & Schweigert (1992), measures the interaction patterns on a five-point scale from "seldom" to "frequently". The questions are centred on turn-taking, focus, time and interest in interaction. Tables 2 and 3 show the difference between the present interaction pattern and how the seven caregivers would like it to be according to the CCI questionnaire. They show where the caregivers wished to make changes in either a positive or negative direction. The number of plusses and minuses show how great a degree of change is wanted.

Procedure and Instruments

The researcher's prior knowledge about the participants was extensive as they were selected from Wilder (unpublished report) and had participated in

Table 1. Participants' behaviour style profiles according to CRIB (Carolina Record of Individual Behaviour).

Child	1	2	3	4	5	6	7
Activity	8	7	3	4	6	7	2
Reactivity	6	5	3	8	1	6	2
Goal direct.	3	6	3	4	5	3	1
Frustration	9	4	7	1	5	7	
Attention span	4	7	5	4	5	7	3
Receptivity	5	6	4	5	5	7	4
Tonus	6	6	8	5		6	9

Table 2. Wish for change from the CCI questionnaire, focusing on the child's contribution to the interaction. The number of plusses and minuses show how great a degree of change is wanted.

Child	1	2	3	4	5	6	7
Initiate interaction	+ +	−		+	+		+ +
End interaction	− − − −	+	+	− −	+ +	+ +	+ +
Respond com.	+	+	+	+	+		
Understand com.		+	+	+	+	+ +	+ + +
Direct attention		−	+	+ + + +	+ + +	+ + + +	+ + + +
Decide subject	− −	− −			+ + +	+ + +	+ +
Decide time	− −	− −		− −	+	+ +	+
Time to handle obj.		−			+	+ + +	

Wilder and Granlund (2003) and Wilder *et al.* (2004). Furthermore, the researcher was familiar with the field of research. The children were not familiar with the researcher although the caregivers were as they had participated in earlier studies by the researcher. The caregivers gave informed consent after being informed that the data would only be used for research purposes, that the data would be treated with confidentiality and that they could end their participation at any time.

The study was undertaken by means of home visits, lasting approximately 3.5 hours, where interaction between child and caregiver was video recorded. In preparation for the video recordings, the importance of the caregivers' opinions, ideas and subjective participation in the interpretations of the children's behaviour were stressed. This was done to ensure involvement from the caregivers, a good atmosphere and interaction between the researcher and the caregivers. The aim of the video recordings was to film the child–caregiver interaction in the home environment. The video recordings were approximately 40 minutes long and were concentrated on the child's reactions to

Table 3. Wish for change from the CCI questionnaire, focusing on the caregiver contribution to the interaction. The number of plusses and minuses show how great a degree of change is wanted.

Caregiver	1	2	3	4	5	6	7
Respond com.		− −	+		+		
Same expressions		−	+		+ +		
Understand com.	+ +	+	+ +	+ +	+ + +	+	+
Show interest		−			+	+ + + +	
Direct attention	+	+		+		+	+ +
Keep concentration	+	+		+ +	+	+ +	+ +
Use app. objects				+ +	+ + + +	+ + + + +	
Know situation	+			+ +	+	+	
Pace adjustment				+		+ +	

known and unknown stimuli. This was done in order to capture the typical interaction patterns the child showed in different situations. The children did not show any reactions to being video recorded; they did not seem to notice it. The first 10 minutes of the video recordings functioned as a warm up for the dyad and were not included in the sequences that the caregivers later chose.

When the observations were terminated the caregiver and the researcher viewed the film together and the caregiver was asked to choose 3–4 sequences that showed typical reactions to something unknown, something known and a negative affect to something that the child did not like. These sequences were collaboratively analysed using the instrument Affective Communicative Assessment (ACA) (Coupe O'Kane, Barton, Barber, Collins, Levy & Murphy 1985). The instrument facilitates detailed documentation of the child's positive and negative affective responses to stimuli. By getting to know the child's behaviour, new ways to communicate can be formulated by using the typical reactions that the child already performs in a new way (Coupe O'Kane & Goldbart 1998). In the mutual discussions the caregivers gave their interpretation of the children's different ways of affectively communicating. They also chose how they would phrase the reaction in words; for example, total enjoyment or great discomfort. In this way ACA functioned as a direct instrumental standardization of the video recordings at the home visits and gave the researcher more knowledge about the children's behaviour repertoires.

After each home visit the caregivers were sent a copy of the whole video observation on them and their child. After the sequences of typical interaction had been analysed the families received feedback about the findings.

Data Analysis

The data analysis was concentrated on looking for patterns of different variables. The caregiver-selected sequences of typical interaction to something known were chosen for further analysis because according to ACA the children used most of their behaviour repertoire in these interactions. The mean length of the seven sequences of this typical interaction was 1.58 minutes. Six caregivers chose a common play situation while one caregiver chose a more exciting play situation, for example playing with a familiar toy versus playing with the vacuum cleaner. In order to study the turn-taking in the dyad the children's abilities to take their turn were documented. This was done by reviewing all background information from earlier studies about the children's abilities and combining it with the information given by the caregivers at the home visits. The full video recordings also added to the documentation of the children's abilities to take their turns. For this step, the actual home visits and the caregivers' wording of their interpretation of the interaction in the chosen sequences became of great importance for the researcher to become familiar with the children's way of interacting.

The sequences were initially watched several times by the researcher and the turn-taking in the interaction was documented according to a time axis. The caregiver-selected sequences of interaction were analysed focusing on initiation, response and ending behaviour of both parties. The sequences were transcribed and coded per second. In the analyses of the caregiver-selected sequences of typical interaction a model constructed by Light (1985) and adapted by Björck-Åkesson (1992) was used (see Figure 1). According to this model the dynamics in the interaction are analysed by studying the turn-taking process between the parties in the dyad. The analysis takes into consideration the function of each turn in relation to the preceding and following turn. The children's and the caregivers' motor and verbal behaviour, smiles and laughter and direction of gaze in the interaction are considered in detail to be components of interaction. In coding a sequence, different amounts of interaction components and how many seconds a turn-taking prolonged are determinants for strong or weak interaction turns. In this way interaction patterns over several turns and entire sequences can be reached for each individual in the interaction. Patterns of their interactive styles can be explained according to frequency of weak or strong initiatives, responses and endings in interaction.

Using the above model, the turn-taking can be analysed according to three levels. At the first level, it is determined whether the turn-taking is a communicative turn or if it is only an opportunity. At the second level, the communicative turn is labelled as a response or initiation while the turn opportunity unit is labelled parallel behaviour or ignored behaviour. At the

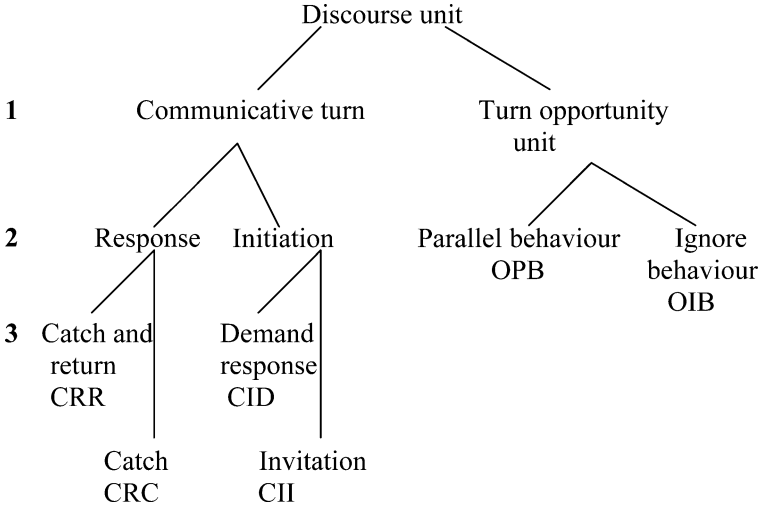

Figure 1. Model for the analysis of the interaction. CII: communicative turn, initiation, invitation. CID: communicative turn, initiation, demand response. CRR: communicative turn, response, catch and return. CRC: communicative turn, response, catch. OPB: turn opportunity unit, parallel behaviour. OIB: turn opportunity unit, ignore behaviour, ACC: accord.

third level of analyses, the responses and initiations are divided into labellings of how strong or weak the responses/initiations were.

CII (communicative turn, initiation, invitation) and CID (communicative turn, initiation, demand response) are types of turn-taking that invite a continuation of the interaction. CRC (communicative turn, response, catch) and CRR (communicative turn, response, catch and return) are turn-taking methods that constitute responses. On the other hand, OPB (turn opportunity unit, parallel behaviour) and OIB (turn opportunity unit, ignore behaviour) involve a discontinuation of the turn-taking. OPB means that the focus is still shared although the partner does not take its turn. OIB means that the focus of attention is broken by another totally different activity or that the individual just ignores the behaviour of the other partner. A pause in the interaction is when the partners are not occupied with the same focus, there is no interaction and thus no turn-taking. ACC (accord) is when the partners share focus in the interaction but neither of them interact by taking their turn, although they are occupied with the same activity and share joint attention. It is a form of interaction although no turn-taking takes place. On the other hand, pauses are not a form of interaction as they mean that the parties do not share focus or joint attention. In accord the parties understand each other and experience something together which is contrary to pauses. Accord can be felt to be a well-functioning part or moment of interaction and be part of the caregivers' conscious monitoring activity.

Table 4 shows how the responses can be coded into either strong or weak, depending on how long the responses are and on how many components of communicative behaviour the partner uses.

Results

Table 5 presents analyses of the children's and the caregivers' interactions in the caregiver-selected sequences of a typical interaction. The frequencies of the different types of turn-taking that the child and caregiver use and exhibit should be read in comparison with the length of the sequences. Both pause and accord are presented as percentages of the total sequence. In Table 5, the numbers represent the frequencies with which the child and the caregiver exhibit each type of turn-taking.

Table 4. Coding of the turn-taking.

Strong turn-taking	
Catch and return (CRR)	Contains three or more components i.e. look, vocalization, smile and/or a strong vocalization and/or a directed look.
Demand a response (CID)	Length >2 seconds
Weak turn-taking	
Catch (CRC)	Contains less than three components and/or weak vocalizations.
Invitation (CII)	Length <2 seconds

Table 5. The children's and the caregivers' turn-taking in a typical interaction. The numbers represent the frequencies with which the child and the caregiver exhibit each type of turn-taking (child/caregiver).

Dyad	1	2	3	4	5	6	7
Length of interaction (min)	2.30	1.55	2.47	1.1	2.52	2.19	1.31
CII	4/11	1/16	2/27	7/9	15/18	3/4	1/9
CID	2/0	2/4	0/3	0/0	0/4	3/4	1/6
CRC	22/19	15/15	21/20	6/6	22/22	6/7	11/8
CRR	0/0	3/1	1/2	0/4	0/2	3/1	6/6
OPB	6/7	7/5	22/2	5/2	18/13	4/6	7/4
OIB	1/1	0/0	6/0	10/1	5/0	2/1	4/0
Pause	22%	2%	0%	16%	0%	0%	0%
ACC	21%	29%	25%	0%	17%	45%	2%

CII: communicative turn, initiation, invitation. CID: communicative turn, initiation, demand response. CRR: communicative turn, response, catch and return. CRC: communicative turn, response, catch. OPB: turn opportunity unit, parallel behaviour. OIB: turn opportunity unit, ignore behaviour, ACC: accord.

The interaction that is analysed in Table 5 shows that the children overall initiated turn-taking infrequently compared to the caregivers, especially not strong turn-taking (CID). When considering the number of responses that the children gave it is clear that they did not very often give a catch and return response (CRR), which means that they did not answer strongly in the interaction. There are individual variations in the frequency with which the children ended interactions, meaning that they did not take the opportunity for turn-taking that they had (OPB and OIB). The caregivers typically initiated turn-taking more often than the children, although they more often started an interaction with a weak initiation than a strong one. The same pattern can be seen in how the caregivers responded in interaction; they more often gave a weak response than a strong one. The caregivers did not use weak responses more than the children in the interaction but they used strong responses more. Accord occurred more often and among most of the dyads compared to pauses. It is only dyad 4 that did not have any accord in the interaction. Pauses occurred in three dyads, 1, 2 and 4, and it occurred most in dyad 1.

In the sequence of dyad 1, the parties in the dyad took their turn relatively equally although the caregiver initiated more often. What characterized this dyadic interaction was that pauses made up 22% of the 2.30 minutes and that there were more responses than initiations. Furthermore, 32% of the sequence were spent in accord. The child and the caregiver showed a similar amount of turn-taking as the other dyads despite the high percentage of pauses and accord. This, plus the fact that there were considerably more responses than initiations in the interaction, indicates that the periods of turn-taking were constituted of several turns and that the turn-taking was quite fast.

In the sequence of dyad 2, another type of turn-taking took place. In this interaction the caregiver initiated turn-taking to a greater extent than the

child did. Furthermore, the child ended the periods of turn-taking that occurred with a parallel behaviour quite frequently. Considering the percentage spent in accord, the length of the sequence and the initiating and ending frequency, there were few turn-takings in the interaction.

In the sequence of dyad 3 the caregiver initiated much more frequently than the child did, while the child ended the turn-taking to a much greater extent. The child ended the turn-taking six out of 28 times by ignoring behaviour. Despite this fact, the number of responses was quite high. This means that the periods of interaction that occurred were short in duration but occurred rather often throughout the 2.47 minutes long sequence and were ended by the child. There were no pauses and 25% of the sequence was spent in accord.

The sequence of dyad 4 was characterized by few periods of turn-taking and by the child ending the interaction frequently. The child sometimes ended the interaction by parallel behaviour but mostly by ignoring behaviour; 16% of the 1.1-minute-long sequence was spent in pauses. This indicates that the child and caregiver did not understand each other very well in the interaction.

The sequence for dyad 5 showed a relatively equal interaction of initiating and response between the caregiver and the child and it showed that the child ended the interaction more often than the caregiver. There was 17% of accord in the sequence of 2.52 minutes. Comparatively, although there existed quite a lot of turn-taking, the periods of turn-taking were short in duration.

The sequence of interaction in dyad 6 showed that the child and caregiver both initiated equally with weak and strong initiations. The responses the parties in the dyad gave were also quite even in frequent although the child gave two more strong responses. What characterized this interaction was that the caregiver ended the interaction more often and that 45% were spent in accord in the sequence of 2.19 minutes.

In the interaction of dyad 7 the caregiver initiated more than the child, although the child responded a little bit more than the caregiver. Furthermore, the child ended the periods of turn-taking more frequently than the caregiver. What was special about this sequence of interaction was that the child responded strongly six out of 17 times and that there existed only 2% of accord and no pauses. This indicates that the interaction was characterized by joint experience and that the child took its turn responding although it did not initiate as often.

In Table 6 a compilation of the data is presented. Where there are blank cells or spaces, the measures were not specific or showed no major wishes for changes.

Behaviour Style and Turn-taking

When comparing the children's behaviour styles with the special features of their turn-taking we see that all children had distinct behaviour styles and interactions. Some tendencies surfaced indicating the influence of hypo- or hyper-dominated behaviour styles. Children 3 and 7 showed hypo-dominated behaviour styles. The similarities in the interaction of both these sequences were that the caregivers initiated considerately more than the children did,

Table 6. Compilation of the children's interactions according to the CRIB and CCI instruments and analyses of the turn-takings in the sequences of typical interactions.

Dyad	CRIB	CCI (child)	CCI (caregiver)	Turn-taking (child/caregiver)
1	Activity: 8 Reactivity: 6 Frustration: 9 Goal dir. = 3 Attention: 4	Init inter: + + End inter: − − − − Dec. subj: − − Dec. time: − −	Und com = + +	CII: 4/11 CRC: 22/19 Pause: 22% Acc: 21%
2	Activity: 7 Reactivity: 5 Frustration: 4 Goal dir.: 6 Attention: 7	Dec. subj: − − Dec. time: − −	Resp com: − −	CII: 1/16 CRC =15/15 OPB: 7/5 Pause: 2% ACC: 29%
3	Activity: 3 Reactivity: 3 Frustration: 7 Goal dir.: 3 Attention: 5		Und com: + +	CII: 2/27 CRC =21/20 OPB: 22/2 Pause: 0% ACC: 25%
4	Activity: 4 Reactivity: 8 Frustration: 1 Goal dir.: 4 Attention: 4	End inter: − − Dir. att: + + + + Dec. time: − −	Und com: + + Keep con: + + Use act. obj: + + Know sit: + +	OPB: 5/2 OIB: 10/1 Pause: 16% ACC: 0%
5	Activity: 6 Reactivity: 1 Frustration: 5 Goal dir.: 5 Attention: 5	End inter: + + Dir. att: + + + Dec. subj: + + +	Same ex: + + Und com: + + + Use act. obj: + + + +	CII: 15/18 OPB: 18/13 OIB: 5/0 Pause: 0% ACC: 17%

Table 6 (*Continued*)

Dyad	CRIB	CCI (child)	CCI (caregiver)	Turn-taking (child/caregiver)
6	Activity: 7 Reactivity: 6 Frustration: 7 Goal dir.: 3 Attention: 7	End inter: + + Und com: + + Dir. att: + + + + Dec. subj: + + + Dec. time: + + Tim to m.: + + +	Show inte: + + + + Keep con: + + Use act. obj: + + + + +	OPB: 4/6 OIB: 2/1 Pause: 0% ACC: 45%
7	Activity: 2 Reactivity: 2 Goal dir. = 1 Attention: 3	Init inter: + + End inter: + + Und com: + + + Dir. att: + + + + Dec. subj: + +	Dir. att: + + Keep con: + +	CII: 1/9 CID: 1/6 OPB: 7/4 OIB: 4/0 Pause: 0% ACC: 2%

CRIB (Carolina Record of Individual Behaviour): specific hypo- or hyper-loaded measures of the children's behaviour styles.
CCI (Child and Caregiver Interaction) (child): the caregivers' wishes for where they wanted the children to make extensive changes in interaction (more than one plus or one minus).
CCI (Child and Caregiver Interaction) (caregiver): the caregivers' wishes for where they wanted themselves to make extensive changes in interaction (more than one plus or one minus).
Turn-taking: the dominating features of each dyad from analysis of a typical interaction in Table 5.

although when the focus of interaction was determined, the children gave many responses. Child 4 also had a hypo-dominated behaviour style although the reactivity level of this child was quite high. Both the high reactivity level and the many times the child ended the periods of turn-taking, especially by ignoring behaviour, were distinct for this child and its interaction.

Furthermore, when the children showed a more hyper-dominated behaviour style the turn-taking seemed to become quite fast. Children 1 and 2 showed hyper-dominated behaviour styles. The activity levels of the children were quite high and in these interactions the turn-takings were fast. Child 2 had a higher measure of goal directedness and attention span than child 1. Child 6 showed a hyper-dominated behaviour style with low goal directedness. There was 62% of accord in the interaction and the caregiver did not initiate at that time and overall ended interaction more often than the child did. Child 5 had close to normal on all behaviour style measures except the reactivity level, which was very passive. The child initiated less often and ended interaction more often than the caregiver did.

Behaviour Style and Readability

Readability is a dimension of the children's characteristics that together with their behaviour styles come to influence the interaction. If a child is difficult to read it is difficult for the caregiver to monitor in a way that alleviates or improves the interaction. Components of behaviour that make the interaction more readable are certain dimensions of behaviour style, for example hyper levels of reactivity and activity, and, for example, smiles, vocalization and gazes. Furthermore, if a communicative behaviour is longer than one second it is also easier to read (Light 1985, Björck-Åkesson 1992). For example, child 7 had a hypo-dominated behaviour style, as had children 3 and 4 according to the CRIB questionnaire. Although they all had hypo-dominated behaviour styles, the interaction in each dyad was different. In the interaction of dyad 7 the child responded 17 times and six of those were strong responses. The child initiated once. This means that the child in each of these strong responses or in the strong initiation used three or more components and that the responses were longer than two seconds. According to the ACA instrument and the video recordings, the child smiled, gave vocalization and gazed at the caregiver in these strong turn-takings. The child in dyad 3 gave a strong response once and child 4 gave none. Furthermore, none of these children initiated strongly. Child 3 very seldom used vocalizations and smiles in interaction, although the child did gaze at the caregiver. Child 4 did not smile in interaction or gaze at the caregiver; the child made sounds but not in connection with other communicative behaviour. In consequence, the ease of reading these children was very different. When it is difficult to read a child it becomes difficult for the caregiver to monitor the interaction, and in consequence successful interaction does not occur as often.

Another example is the interaction in dyad 5. According to CRIB, the child had close to normal measures on the behaviour style dimensions except reactivity where the child measured very low: a passive reactivity. In the

interaction, the child initiated and responded almost to the same extent as the caregiver, although the child did not use strong turn-taking and ended interaction frequently. According to the ACA and the video recordings, although the child smiled a lot, the child very seldom gazed at the caregiver in the interaction. Furthermore, the child gave sounds but it was not always connected with communicative behaviour. In the analyses of turn-taking the periods of turn-taking can be seen to be of short duration. Consequently, in the interaction the child was active but dubious in readability. In order to monitor the interaction towards well functioning moments, the caregiver initiated turn-taking a lot.

A final example of how caregivers monitor interaction differently depending on the readability of their child and their behaviour style is the interaction in dyad 6. This child had a hyper-dominated behaviour style according to CRIB, with especially high measures of activity, reactivity and frustration. The video recordings and ACA showed that the child was very readable. The child smiled, laughed and used communicative vocalization, gazes and gestures. In interaction, the child initiated and responded to the same amount as the caregiver, although the child used more strong turn-takings than the caregiver. In the caregiver's monitoring in the interaction, the caregiver slowed down the interaction and the child's activity. The caregiver ended interaction more often than the child did and there were also 62 seconds of accord in the interaction.

CCI and Turn-taking

Furthermore, Table 6 shows that there were similarities between the individual caregivers' wishes for change in the interaction and the nature of their turn-taking in their dyad. For example, the caregiver in dyad 1 wished that the child would end interaction less often, initiate more, decide the subject to interact about less and decide the amount of time spent in interaction to a minor extent. Moreover, the caregiver wished to understand the child's communication more. In the turn-taking of typical interaction the analyses showed that the child did not initiate as much as the caregiver, with a weak initiation 4/11, and strongly 2/0. Furthermore, 33% of the sequence was spent in pauses and 32% was spent in accord. In comparison, the results from the different instruments show that the changes that the caregiver wished for can be understood when reviewing the analysis of the interaction. For example, the high percentage of both pauses and accord indicate that the child decides both the time and subject to interact about to a great extent. In CCI it is apparent that the caregiver wished that the child would do this less. The caregiver's wish that the child would end interactions less frequently is also reflected by the high percentage of time spent in pauses. Furthermore, the wishes the caregiver had about the child's initiation frequency and the wish to understand the child better in interaction was also reflected in the analysis of the turn-taking.

Another example is dyad 4 where the caregiver wished that the child would become better in directing the caregiver's attention, end interaction less often

and decide the amount of time spent in interaction to a miner extent. The caregiver wished to understand the child better in interaction, to better be able to keep the child's concentration, to better use objects and activities that fit the child's age and to better know situations that tempt the child to communicate. The analysis of the turn-taking showed that the child ended interaction much more than the caregiver, the child ended interaction strongly most of the times, 10/1 compared to 5/2. Another feature of their interaction was that 16% of the sequence was spent in pauses and none in accord. These results show that the child did decide the amount of time spent in interaction – it did so by ending it to such a great extent. Furthermore, the caregiver's wish to understand the child better was reflected by the number of times the child ended interaction together with the low percentage of pauses and accord.

Discussion

The Dynamics in Interaction and Relationship to Behaviour Style

This study investigated the dynamics of the interaction and their relationship to behaviour style in seven families with children with multiple disabilities who functioned pre-symbolically. A qualitative approach was chosen, as the focus for investigation was interaction and characteristics of the parties in specific dyads. In-group comparisons were made in a search for patterns.

According to the ecological and transactional models, interaction is coloured both by the child and the caregiver (Bronfenbrenner 1999, Sameroff & Fiese 2000). In the interactions of these seven children with their caregivers the children's behaviour styles and readability are factors that influence interaction. The caregivers lead the interaction by using their knowledge about the children's usual way of interacting, the children's current mood and situation as well as the whole context (Wilder & Granlund 2003). Different ways of interacting are necessary for different dyads in order for the interaction to be successful. The caregivers observe and arrange the interaction according to the dyadic specific conditions. The caregivers' knowledge is built up by the everyday interaction that occurs in the dyad (Wilder & Granlund 2003). Furthermore, the children inhabit mental schemas of what an interaction usually consists of with the caregiver, and therefore they have expectations. In this way, two parallel processes occur in the interaction of each dyad that are circular rather than linear in form: monitoring interaction and successful interaction. These two processes can be seen as occurring especially in the caregivers' functioning in the interaction, but also in the children's.

More concretely, the caregivers monitor the interaction by the type of turn-taking they use, both by the amount of time and the components they use. For example, this is reflected by either a strong or weak initiation or response. Some caregivers take more time initiating an interaction and use more expressive components while others are quicker and more direct (see for example dyads 7 and 3). The amount and type of responses that the

caregivers use are in the same way different to each other (see for example dyads 4 and 1). The children influence the interaction by the way they respond and end interaction. This comes to influence the way the caregivers monitor interaction; if they can read the response they adjust according to it. If they cannot read the children's responses the monitoring is still influenced. The children may end interaction and the caregivers must adjust their interacting methods accordingly. In the effort to accomplish a prolonged period of successful interaction the caregivers end interaction rather infrequently.

The results support Granlund and Björck-Åkesson's (1998) findings that children with multiple disabilities display affective expressions but that these are sometimes hard to notice by the caregiver and respond to respectively. The results show that the readability of the children is important to how the interaction functions. Although the results replicate the suggestion made by Wachs (2000) that children with disabilities who show a hyper-dominated behaviour style are easier to read than those who have a hypo-dominated behaviour style, the results also indicate that there are certain components of communicative behaviour, such as smiles, that make the child more readable than others. Furthermore, when taking the children's functional disabilities into account it is clear that differences in behaviour style and readability are not related to etiology, supporting the findings of Huntington and Simeonsson (1993).

It is difficult to find clear patterns for how behaviour style shows itself in interaction. The dimensions of activity and reactivity seem to be especially influential factors for the interaction. High measures on these dimensions make the child more readable and the interaction especially fast. Goal directedness and attention span seem to be more indirectly entwined in influencing interaction. For example, a wide attention span and high goal directedness appear to make it easier for the child to engage in joint attention. Frustration did not seem to be an influential factor in these dyadic interactions, although the children had distinct measures of this temperamental dimension. When frustration shows itself the monitoring for an optimal interaction would be anticipated to seize and a stabilizing process to begin. The analysed sequences did not involve direct frustrating moments, as they were sequences of typical interaction to something known.

Conclusions

A triangulation of methods was obtained with the CCI and ACA questionnaires and the video analyses. The caregivers' opinions of the caregiver–child interaction had been measured with CCI in Wilder, Axelsson and Granlund (2004) and Wilder (unpublished report). In the present study, video recordings of caregiver–child interaction were made and ACA was used by the researcher and the caregivers to collaboratively interpret and discuss the child's behaviour repertoire immediately following the video recordings. Video analyses were made on caregiver-selected sequences of typical interaction from the same video recordings. There were similarities between

the way the caregivers took their turn in the interaction and what they stated that they wanted to be changed in the interaction in the questionnaire CCI. The results of the present study show that these three methods completed each other; the three types of analyses came to the same results although at different levels of depth. In this way a triangulation was obtained.

When considering the triangulation it is clear that the caregivers know their children very well and that they use their knowledge in the everyday monitoring of interaction. These results show that the caregivers know what to strive for in the interaction and they know their children's limitations and characteristics. It is important that professionals see the caregivers as experts on their children and that they are included in intervention planning (Knox, Parmenter, Atkinson & Yazbeck 2000, Olsson & Granlund 2003). Furthermore, as professionals feel most discomfort in consultation situations about children with severe disabilities (Wesley, Buysse & Keyes 2000) it is important to find ways of intervening that are facilitative. The three instruments ACA, CCI and the model for analysing turn-taking constructed by Light (1985) can be used in an emancipatory way by caregivers as they are inclusive in kind and see to the everyday interaction in the dyad (Ferguson & Ferguson 2001). Although video-based intervention takes time and resources, its effectiveness has been documented repeatedly (Reamer, Brady & Hawkins 1998). As a suggestion and a proposal for further research, professionals and caregivers in interaction interventions can use these instruments in combination.

The home visits and video recordings were quite lengthy and the researcher gained a deep understanding of the children's behavioural repertoire. This was also a result of the amount of data that has been collected over the time period of three studies, which have included the same participants. In consequence of the pre-understanding of the researcher together with the triangulation of the instruments ACA, CCI and the video recordings another researcher was not engaged in the analysis of the interaction. This could be considered to be a limitation of this study, although it was rational as it would be difficult for a second observer without the same pre-understanding to interpret the observed behaviour. Further limitations of the study were that due to time limits the number of sequences analysed were few and they were quite short in duration. As a consequence, the results should be considered tentatively and to be of an exploratory kind.

It is also important to reflect upon the roles of the caregivers in this study. They have a significant role in this study as all information about the children comes through them. The sequences were selected by the caregivers and in the video observations the caregivers gave their point of view about the dyadic interaction by the ACA instrument. It can be argued that the results are biased as a consequence of this, although this reflects the reality of these children's dependency on their close life partners. In this study the researcher has tried to involve the caregivers for the purpose of validity and reliability as it is through them an outstander can receive an understanding of these children's behaviour repertoire, interaction, and overall characteristics. Furthermore, the caregivers' interaction and behaviour repertoire are also

analysed in the questionnaire CCI and also analysed per second in the data analysis of the video observations.

This study has shed light on the influence that the characteristics of presymbolic children have on interaction and thus in the children's niches. The qualitatively successful interaction can boost the development of children through proximal processes occurring in niches (Wachs 2000). In order to boost children's development it is important that caregivers take into account the children's characteristics and abilities. For this to happen it is essential to make the caregivers aware of their knowledge and to make them assertive. Intuitive parenting is not enough when children have disabilities (Waxman, Spencer & Poisson 1996). As Wachs (2000) discussed, certain individual characteristics can close or open niches for children. It is important to make explicit the individual conditions for each child who has disabilities in order to keep as many niches as possible open. It is clear that the children's personal stimulus qualities are only one factor in the formation of niches. For further research it would be of interest to study qualities in caregivers and the family that can describe further how niches are built for children who function presymbolically and also what role interaction has in the system of the family for these children. It would be especially interesting to study cultural and contextual influences on interaction such as family routines, family adaptation and social networks of children and families.

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