A multiple case study of the effect on Emerging Body Language

A pioneering study of a promising treatment for children with below-average cognitive capacities and behavioral problems

Sonja van Veen-Graafstal

Supervised by:
1. Prof. Dr. A. M. T. Bosman
2. Dr. R. Cox

Dedicated to:
Carine Heijligers

Date, 24 August 2011

Radboud Universiteit Nijmegen

Abstract

The purpose of this study is twofold. One, it is a pioneering attempt to investigate the effect of applied interventions of a promising treatment, Emerging Body Language, for children with intellectual disabilities and behavioral problems. The process of change of the interactions between three client-therapist dyads is examined with respect to their communication. Results revealed the emergence of different patterns in the well-established structures of the client's interactions, due to interventions based on synchrony and rhythm. Two, the theoretical assumption underlying this treatment is that all human beings are self-organizing systems. Therefore, the need for a holistic perspective and systemic approach will be substantiated by means of a relatively extended theoretical discussion.

Introduction

In September 2010 a national symposium was held in the Netherlands on the topic: " 'Difficult' teenagers and young adults with below average cognitive capacities". The fact sheet of this congress mentioned that 440.000 youngsters in the Netherlands, between the age of 5 and 20, are considered to have mild intellectual disabilities. Although the lower and upper borders of the IQ scores are under debate, consensus exists about the vulnerability of this group in general, because of the co-occurrence of behavioral problems. These youngsters are easily influenced and therefore, at great risk to get involved in criminal behavior, aggression, or substance abuse. What's more, some youngsters suffer from additional psychiatric disorders such as autism, borderline disorder, or attachment problems. These multiple problems, often not recognized, result in insufficient care or the conviction of these youngsters as criminals, resulting in referral to judicial institutions. A significant group of teenagers and young adults are threatened in their social and emotional development, due to lack of adequate care. The fact sheet ended with an invitation to attend to this national symposium to join hands with practitioners, scientists and other experts to exchange the latest findings with respect to diagnosis, guidance, and treatment (Newsletter Euregionaal Congresburo, 2010).

Recent research complements this heartbreaking cry from the professional care practitioners. The chance that children with intellectual disabilities (ID) develop psychopathology is approximately three to four times higher than typically developing children (Einfeld et al., 2006). According to Emerson (2003), psychopathology can be understood as any diagnosed ICD 10 or DSM-IV disorder intervening with and impeding daily live. The problem of psychopathology co-morbid with intellectual disability is persistent and the need for effective interventions is very much needed (Einfeld et al.). Embregts and du Bois (2005) underscore this

statement by arguing that the group of youngsters with ID and severe behavioral problems are at risk to be left behind, because too little adequate care is available.

Interventions

This raises the question if or why nothing has been achieved over the past decades in providing good care for children with ID and behavioral problems? Certainly a lot of work has already been done. A variety of treatments are developed to help these youngsters to learn socially adaptive behavior. In ordinary youth care, most treatments are based on cognitive capacities to process verbal information and to understand the rationale of the instructions. However, these methods are largely insufficient for the group of children, who are impaired in their cognitive capacities. Therefore, some treatments go back to Skinner's learning theory (1953). Professional caregivers have to shape the desired behavior in children by principles of operant learning. One of the most well known treatments, based on behaviourism, is Applied Behavior Analysis (ABA). In the study of Lovaas, Koegel, Simmons, and Long (1973), the home-based program provided good results and improvement for children with ID and autism. In a more recent study by Cohen, Amerine-Dickens, and Smith (2006), conducting a replication of the Lovaas study (1973), a positive effect on adaptive behavior was found, following the treatment. In residential care another commonly used treatment is the so-called Competency Model (Slot & Spanjaard, 1999). The emphasis of the treatment is basically positively orientated; it is focused on adaptive and positive behavior, rather than on problems and maladaptive behavior. The reward system, however, is based on the same operant learning principles as in ABA treatment. The focus of the treatment is the enlargement of the competence of the client and to make him co-responsible for his own development. Nevertheless, the principle of the model is based on the ability to express oneself in a verbal manner and to be able to reflect on one's actions.

Notwithstanding the progress that has been made over the past decades, a significant group of youngsters apparently does not seem to profit from the above-mentioned treatments, shown by the necessity of organizing a national symposium. Several researchers have tried to clarify why those methods do not seem to be effective for these children and teen-agers. They came up with three reasons. One, operant learning is very much context dependent and behavior does not easily generalize to other contexts (Ouellette & Wood, 1998). The same result was also found in the study of Lovaas et al. (1973). Two, operant learning is based on strengthening neural connections that already exist (Kandel & Hawkins, 1992). But, learning new skills requires self-control to inhibit immediate response tendencies and perform the desired behavior. This cognitive task requires an effort that does not seem to suit children who are impaired in cognitive functioning (Muraven & Baumeister, 2000). Three, results from attachment studies have stressed the importance of the relationship between caregiver and child, in order to promote a healthy development or to restore an impaired development (Bowlby, 1969). This point is in line with more recent research, where the attention has moved towards the influence of the attitude and behavior of the supervisors or caregivers on the clients' behavior (Embregts, Didden, Huitink & Schreuder, 2009; Grey, Hastings & McClean, 2007). Thus, it appears that a shift of perspective has occurred, away from the (problematic) behavior of the client, towards supervisor's behavior and attitude.

In order to open up new perspectives on research and treatment, a third unit of analysis is recommended and conducted in this present study, the 'client-caregiver dyad' as an entity, a system. Although this might seem innovative, yet this kind of research goes back to the fifties of the past century. The Boston University group had been engaged in three major projects that started in 1954 with a ten-year naturalistic longitudinal study of thirty mother-infant dyads, followed from the prenatal period through the first year at school (Pavenstedt, 1961, 1964; Sander, 1969). Expanding the investigation, Chappell and Sander (1979) have carried out research with the 'neonatal-mother dyad' as unit of analysis. This present study will blow off the dust of this (maybe) long forgotten research. The study of Chappell and Sander contains some interesting perspectives that are most helpful to clarify this present investigation. First, an overview and theoretical background of their study will be given, stressing the points that run parallel with this current study. Then, this present study will be explained and clarified, by deriving conclusions of the discussed studies. The remainder of the present study will be devoted to three client-therapist dyads, which are engaged in a therapeutic relationship. The results of this engagement reveal the potential of an alternative approach to children with ID and behavioural problems.

Theoretical perspective
Chappell and Sander

Starting from a general interest in the ontogenesis of human communication, especially in the preverbal period of life, Chappell and Sander started in 1972 an investigation of the characteristics of interactions and exchanges between the infant and his caregivers. They suggested that some early coordinations in the interaction will be established and form the basis of an increasingly complex repertoire of the infant behaviors. Narrowing their horizons, they asked themselves questions about the organization of the infant-mother dyad: How does the exchange between them become integrated and regulated? They wanted to identify the changes the dyad showed over time and hoped to attack the problem of organization of the dyad.

The researchers proposed to adopt an organismic or holistic perspective and to think of the infant-mother dyad as a biological system, possessing features common to all living systems. They argued that studying a system means examination of the process of how a system behaves, gets organized or integrates new information. This has nothing to do with causal relationships or isolating determining factors, but with looking for regulatory mechanisms that are responsible for the change and maintenance of the system. So, their main interest gradually moved away from the problem of organization towards a search for mechanisms of regulation.

The researchers maintained that the basic elements of the biological system consist of cells that show spontaneous endogenous activity with self-regulatory activities. This means that events, occurring in the environment, do not *start* the activity, but only may influence or perturb their ongoing activity. Consequently, each element belonging to a system interfaces with other elements, coordinated by regulating mechanisms, which characterize biological systems in general. Chappell and Sander focused on two large categories of principles that regulate the exchange. First they mentioned biorhythmicity, being related to biological organization as a

matter of time and timing. It concerns integrating new elements into the semi-independent endogenous biorhythmic elements, by creating a temporal organization. Related regulatory mechanisms to biorhythmicity are entrainment, phase-shifting, and phase-synchrony. This means that each system, following its own biorhythmicity, functions in a relatively stable state but, when the system is confronted or entrained by another living system, and drifts away from its own biorhythmicity, the system gets out of balance and becomes temporarily disorganized (phase-shifting), followed by a new phase of stability, which has become in harmony with its own biorhythmicity and thus providing integration of the system. Summarized, mechanisms that are related to biorhythmicity contribute to the regulation, adaptation, synchronisation, organization, and integration of the system.

The second category consists of cybernetics, including processes of feedback control and also of guidance and goal-oriented action. Initiation of action, goal direction and goal realization, leading to adapted action are governed by cybernetic principles and important elements in the exchange of a mother-infant system. They can be studied at the level of interactions, which can be observed as a sequence of behaviors in which mother and child are engaged.

Chappell and Sander conducted in 1972 a pioneering study to examine empirical details of exchange between the neonatal and his mother. They recorded a 24 hours pattern of sleep and waking periods of the neonatal during the first eight days after birth. 'State of the infant' was the behavior under study. State was defined in seven categories ranking from quiet sleep to active wakefulness. This state pattern can be viewed as the context in which other behaviors occurred. They also observed the interaction between mother and child during eight full awake periods, spread over the first eight days of life. The preverbal 'communication' of the mother-neonatal dyad existed of mother's behavior, defined as measures of distance between the pair members and posture of the child, and the response of the infant, being defined as a matter of change or not of the infant's state. The effect of mother's behavior, changing distance and/or posture of the infant, on the state of the child, getting / staying drowsy or becoming / staying alert awake, was categorized as optimal or non-optimal (for example, the effect was regarded to be non-optimal when the child changed its state, due to postural change or change of distance, from drowsy to full awake, when it was supposed to go to sleep). The results showed increasing synchronisation of the mother-infant dyad, with respect to mother's manipulations with respect to the state of the child, reflected in optimal state changes or optimal non-change of state. In other words, the mother and the infant had established some way of preverbal communication; they got attuned, because they achieved some sort of mutual agreement about the meaning of their actions. The effect of their 'communication' was easily seen, it played a direct role in the synchronisation of the pattern of the child's sleep-wake cycling.

Condon and Sander

In 1974, Condon and Sander conducted another study on the interaction between the neonate and his caretaker. Prior to this, in the early sixties, Condon started to study human communication, by systematically examining sound films, at a frame-by-frame level (Condon, 1970). After years of painstaking labour, he

discovered that individual and interactional behavior was temporarily synchronized. He observed that when a speaker is talking, several of his own body parts are moving at the same time and on the same rhythm, which can be regarded as self-synchrony. More surprisingly, this is also the case between people when they interact, including children. The listener precisely synchronizes his movements with the flow of the speaker's speech, like a dance. Condon called this interactional synchrony. The question that Condon and Sander put forward was: How early in life does this possibility to get entrained by the sound of speech start? They discovered that the neonate from the first day of life moves or changes its movements in a rather precise and sustaining manner with the articulated structure of adult speech. This ability to get entrained and to synchronize is remarkable and opens up new perspectives on enculturation.

Follow-up studies on children with autistic-like behavior and children with childhood dysfunctions, however, showed very different outcomes in comparison with normally developing children (Condon, 1979). Children with autistic-like behavior showed a delay in their response on sound (sometimes of one second) and even appeared to get entrained repeatedly on the same sound. Condon described this phenomenon as multiple entrainment: The bodily movements that synchronize with the sound appeared to be delayed and appeared several times. This discovery is of particular relevance in the care of the children with autistic-like behavior. Their strange and often bizarre movement behavior might be regarded as a problem of processing auditory information, their impaired ability of getting synchronize with sound, or their tendency to be multiple entrained by sound (Condon, 1979).

Stern

A contemporary of these researches is Stern, a psychiatrist, who became interested in psychopathology and its onset. Retrospective interviews with clients did not bring the answers he hoped for, and therefore, in the early fifties, he started to examine the very early development of the child more closely, trying to discover early processes that might be responsible for the onset and development of psychiatric disorders. He observed for more than two decades numerous mother-infant dyads; on the one hand, because he was a psychiatrist and was treating their relationship with each other, on the other hand, because of his growing interest as a scientist in the early development of the child itself and its inner life. How does the child discover the intentions and meanings of its caregivers in the preverbal life? How does the child communicate with its caretakers, well before speech? How does the relationship between the child and those around him develop?

Stern recorded many interactions of mother-infant dyads on video and followed the dyads over years. He incorporated his findings in a book (Stern, 1985/2000), in which he presented a model and perspective on the developing of the self: starting from early life *in* the relationship with his caregivers. He originally described a model with four layers of Senses of Self; all layers building on the previous one and all layers are necessary throughout a lifetime. These layers are named: Sense of an emergent Self, Sense of a Core Self, Sense of a Subjective Self and Sense of a Verbal Self.

The empirical results of all his observations led to similar conclusions as those of his colleagues Condon, Sander and Chappell. All mother-infant dyads used a very

specific tactic in their mutual preverbal communication, which was based on synchronisation of movements. When a mother and child were sharing an affective state, it was observed that mother and child 'communicate and share their feelings' using behavior that matches the rhythm and intensity of their partner. The corresponding behavior, whether it consists of movement or speech, goes beyond mere imitation and is often observed cross modal: for example, the mother speaks in the same rhythm as the swaying of the baby's hand.

The resemblance with the studies mentioned earlier is obvious. Synchronization, one of the regulatory mechanisms of a biological system, has been found in all dyads. The ability to recognize rhythm and to get entrained by another seems to be innate, because newborns, almost effortlessly, move on the flow and rhythm of adult speech. The exchange of affective states occurs by means of rhythm and movements. Synchronization in a dyad eventually leads to the integration of new information. A conclusion that emerges out of the studies is that an important way a system adapts and integrates new information is in contact with another system. Exchange takes place on the level of rhythm and bodily movements, long before speech appears and long before instructions are executed by means of cognition.

More recent research, conducted in the field of psychology, confirmed the importance of synchronisation and entrainment in daily life. Under the heading of Embodied Embedded Cognition a great deal of research has been done over the past twenty years that shed new light on the possibility of using body language in the communication between people and to experience social connectedness with others. For example, according to Marsh, Richardson, and Schmidt (2009), the capacity to coordinate with other people is fundamental for a sense of social connectedness to others. Shockley, Santana, and Fowler (2003), studied postural sway in a conversation of two persons. They found that trajectories of participant pairs moved parallel during the conversation between the two partners. The parallel sway decreased when participants had to converse indirectly, through another person. A lot more research is available, but for the sake of this article, it is enough to known that research in the field of psychology has broadened its scope and examines other processes than the more, well known, cognitive processes to acquire new information.

Conclusions

The studies discussed above, presented a different perspective on research than the more causal related kind of research. The implications of this view are far reaching, both to the scientists and the practitioners, but also for the treatments used in the care for children with ID and behavioral problems. A few implications will be discussed below.

One, it is neither about the client who has to learn adapted behavior, nor about the caregiver who has to change his attitude, it is about realizing that client and caregiver behave like a system *together*. *In* the interaction, the client and the caregiver mutually exchange information; in the interface, they are equal and they learn from each other. Two, effective learning has to be understood as the integration or adaptation of new information in the existing self-organizing system. The regulatory mechanisms to achieve this are: Entrainment, phase-shifting, and

phase-synchrony. This point is related to the reasons why some treatments do not show the expected outcome: Shaping behavior is not the same as integration of behavior. The system has to integrate new behavior into its own system first and create new neural pathways, then strengthening of the neural pathways can occur by shaping the behavior; in the end, the behavior can be transferred to other contexts. Three, because systems behave autopoietic[1], in a sense that they are self-organizing, no definite predictions can be made about expected outcomes. This means that every system under study follows its own course and learning process. Four, this requires naturalistic observational research of existing behavior, more like ethology. To investigate the change of a system, conducting time-series or longitudinal research is more appropriate than taking snapshots of behavior. Five, another kind of analysis and discussion of the results is necessary, because the data should be regarded in a holistic manner. A challenge for researchers might become to investigate whether an overall pattern emerges from all the original patterns of the dyads.

The study

This raises the question what consequences this knowledge might have for possible treatments and the way they are carried out? In the present study, a pioneering attempt will be made to investigate the effect of a promising, yet relatively unknown treatment, Emerging Body Language (henceforth, EBL). This treatment is based on the assumption that all human beings are self-organizing biological systems, always adapting to changing circumstances in the environment. EBL incorporated a lot of assumptions corresponding to the conclusions just derived from the presented studies above. It has been translated into an applied model that can be used in the care for children with ID and behavioral problems. Its main concern is the interaction between people and the development of interactional structures that are needed for adequate communication, but also for healthy social and emotional development. It aims at the enculturation of youngsters: Every person has the right to participate society to their full advantage. In the next section the onset of EBL will be explained, followed by the theoretical design of the EBL model. Then, the main premises of EBL will be discussed in light of the conclusions derived from the studies of Condon, Sander and Chappell. This section will end with the presentation of the research design and research questions.

This study is part of a larger research project, conducted under supervision of prof. dr. Bosman. She came, by mere change, into contact with the creators of EBL, in the early 2000. Its innovative and original perspective on learning and the promising results with children with ID and severe behavioral problems are worth looking for scientific (theoretic and empirical) justification. A publication of the complete theoretical description of EBL is expected in 2013 (Rutten-Saris, Heijligers & Bosman, 2013). Bosman (2008) discusses in her inaugural speech a few aspects of the EBL treatment with respect to attachment. From the website of Bosman, other studies or master's theses with topics that are related to EBL can be retrieved

---

[1] Autopoiesis means self-creation. Structure, function and mechanism interact in the creating and sustenance of living systems (Maturana & Varela, 1998).

(http://www.annabosman.eu). In this study the description of the EBL treatment will be focused on the theory that is relevant to understand this research design and the applied interventions. The aim of this study is an attempt to examine empirical evidence on the effect of EBL; one should not expect a thorough account of the theoretical background of the EBL treatment.

Emerging Body Language

The EBL treatment originated from the cooperation between Rutten-Saris and Heijligers. Both were creative therapists and used to work with children with intellectual disabilities and behavioral problems. Independent of each other, they discovered the obvious influence of bodily movements and rhythm in the coaching of these children. When they met each other in the early seventies, they decided to further cooperate and investigate this remarkable mechanism. They studied numerous videotaped recordings of mother-infant dyads and also started searching for scientific underpinning of their findings. Thirty years of observations and study have led to the emergence of the EBL treatment.

Rutten-Saris and Heijligers defined a model that describes the social and emotional development by means of interactional structures. They have based their model on the work of Stern (1985/2000). As Stern constructed his model with the four successive layers to illustrate the emergence of the self, Rutten-Saris and Heijligers expanded this design into an applied model that consists of five structures of interaction (Rutten-Saris, 1990; 2001), that appear necessary in the development of the self. According to the theory of Rutten-Saris (2002), every person develops five, consecutive and originated from another, 'interaction structures' in the first five years of life. These interaction structures should be regarded as regulatory mechanisms that the system needs in the communication with others and the environment, in the acquirement of new information, but especially in the development of the self.

When, no matter for what reason, the establishment of the interaction structures has not occurred properly, behavioral problems will surely arise. Because the interaction structures originated from each other, gaps in the first and second structure hinder further development of the following structures. According to the EBL model, treatments discussed earlier, such as ABA, and the Competency Model, are not so much effective or ineffective, because it depends when they are applied. Verbal and cognitive processes can only be understood when there is a sound basis. Some youngsters have a long history of care and treatments, but nothing seemed to work. According to Rutten-Saris (2002), these children generally have gaps in the first two interaction structures: Verbal information does not last or is not understood at all. Restoration of the basic modes of interaction is necessary, before other treatments can be effective. When verbal and cognitive instructions do not have the desired effect, another way has to be found to help these children: The techniques used by caregivers and infants in the preverbal phase, consisting of bodily movements and rhythm appear to provide that basis. This will be explained in a moment.

The five interaction structures are classified in five layers: layer A is Attunement, layer B is Turn-taking, layer C is Exchange, layer D is Play dialogue, and layer E is Task/Theme. For the sake of this study, a short explanation will be given only for the first three structures. *Attunement* is the structure that can easily be

traced back to Stern's 'affect attunement'. It has the form: 'being in the same rhythm, alternated with rhythmic pauses'. As explained by Stern, normally the infant is able to recognize synchronization, even cross-modal, and feels connected with the caregiver. During pauses, the infant develops a sense of difference between itself and the other; the 'sense of an emergent self' arises. Attunement takes place as a result of the awareness of the actors and develops naturally. However, it sometimes happens that attunement does not arise spontaneously. All sorts of reasons can be related to this; maybe the infant and the caretaker are a 'difficult match'. Children with developmental disorders are, however, more at risk for the development of problems with attunement: They might respond in a hypersensitive way to sensory stimuli; they might process sensory stimuli in an extraordinary way and so on. Problematic behavior of the infant can be the result of it, because the child is insufficiently aware of the difference between the self and the other, resulting in children who do not seem to have any self, or infants who do not seem to be aware of other people and behave self-determining. The ability to become attuned to another person is innate, but one needs an environment that invites one to get attuned in order to create the structure *attunement.*

When *attunement* is acquired, a next step should emerge: *turn-taking*. According to the theory of Rutten-Saris this has the form 'behaving in the same rhythm, after the other, alternated with rhythmical pauses'. Out of the structure *turn-taking* a 'sense of a core self' arises. The infant is able to take more initiatives and becomes more active in the interaction with its caregiver (Bosman, 2008).

People, who have acquired the third interactional structure *exchange,* are able to vary their behavior, and to add new elements into the interaction. Without this structure one can recognize persons who behave always in the same way or show rigidity. They miss the flexibility to think and accept new elements in the interaction. This is a well-known problem for children with autistic-like behavior.

Summarized, the emergence and existence of the interactional structures (Rutten-Saris, 2002) are intertwined with the development of the self. Gaps in the layers can lead to all kinds of behavioral problems. From the perspective of EBL, clients with problems in the interaction structures should be treated with the missing interactional structures, to restore the gaps. This appears to be possible at all ages, and is not bound to early development as will be shown in the present study. Before, I explain the research design; important assumptions and premises of EBL will be discussed.

The first premise of EBL is that a human being is a biological system that behaves autonomously, is self-organizing, and always needs to adapt to changing circumstances in its environment. This holds a different perspective on behavior than we are used to. Behavior in itself should no longer be regarded as good or bad behavior; the adequacy or meaning of the behavior is determined by the context: shouting for help is adequate behavior, but shouting in a classroom surely not. The inappropriate behavior originated somewhere in the past, because it was necessary and functional (adapted!) behavior at that time. When it is not functional anymore, the client needs to be aware of the inappropriateness of its behavior, not because others tell him so, but because he has developed an inner sense of awareness of his doings. 'Learning' new and adequate behavior and 'unlearning' maladaptive

behavior will get a new content namely, offering a different environment, different interactions, and a different context in which the system can learn. New behavior can emerge and maladaptive behaviors should no longer be needed.

The second premise, one of the implications that arise from this perspective, is that the intervention *always* takes place and *always* will be performed by means of the *interaction* between client and caregiver. It is impossible to help the client integrating new behavior, without realizing that the caregiver is the instrument with which to accomplish this. This means that the intervention to be performed consists predominantly of instructions for the caregiver. (S)He has to interact in a specific way, in order to provoke different and perhaps new behavior of the client. Speaking in terms of a system: The system has to be confronted with new information in the exchange with another system and has to 'deal' with this information, preferably by integration.

The third premise, the intervention consists of regulatory mechanisms that are discussed before: Entrainment, phase-shifting, and phase-synchrony. Entrainment is bi-directional, both partners can be entrained or entrain the other. The caregiver can align his rhythm with that of the client, only for a few seconds, followed by a pause, also for a few seconds, in which the caregiver returns to his own rhythm. Then, the cycle can start all over again. During the break, the client experiences the difference between the alignment and the pause and develops a sense of awareness of the difference between those two states. This is the case when a client is used to walk much quicker than the caregiver for example, but is unaware of it, even when he has been told a dozen times to slow down. The caregiver now aligns his rhythm deliberately with that of the client; both are walking very quickly now. When the caregiver retakes his own rhythm in the pause, and stays behind, a sense of awareness arises and the client may slow down his pace in order to restore their mutual pace. This intervention happens without a word spoken. The caregiver, however, can also provoke the client to align with *his* rhythm. For example by talking very softly, the caregiver entrains the client to talk also very softly. This technique can be used in altering client's weird or disturbing behavior, but also in developing a sense of awareness of the difference between the client and the caregiver.

Phase-shifting should be regarded as a temporal disequilibrium of the system. This requires a different perspective on behavioral change. Regressive behavior that emerges may only be temporal, due to the disruption of the equilibrium. This phase is necessary in the onset of the integration of new behavior. The caregiver can provoke this phase, by reacting differently than the client expects or is used to, or by adding a new element in their interaction that is unexpected.

Phase-synchrony reflects the synchronization of the behaviors of the dyad. During this phase, the client experiences connectedness with the caregiver accompanied by a sense of 'feel good'. Synchronization is a very powerful instrument to gain trust and to exhibit acceptance towards the client. Synchronization can be achieved whilst having a conversation, or playing a game or drinking tea together. It is also a sign that both partners are aware of each other; they behave in a synchronized manner. Synchrony normally takes place out of the awareness of both partners. It is therefore not the same as imitation that can be carried out as a deliberate action. The caregiver, who wants to use synchronization

as an intervention-technique, must become aware of the existence of synchronization during the interaction with the client. This can be achieved by means of instructional feedback, on recorded videotaped sessions.

It should be stressed, that the intervention consists of *regulatory mechanisms* and not of *actions*. It is about *how* the interaction takes place, and not about *what* happened in the interaction. This implies that the caretaker should not follow a protocol, or that he should perform a certain action, to consider the intervention successful. Predictions of outcomes of interventions are therefore hard to make. Every change is an outcome and at the same time starting point for a newly applied intervention. Therefore, the progress of the treatment can only be explained in terms of processes and is not easy to describe in SMART-written goals. The person who intends to apply an EBL intervention is not necessarily a therapist. In fact, almost every person, who has developed healthy interaction structures, is capable of applying the interventions. What makes it hard and difficult is that the structures have emerged in the preverbal phase and that they are used out of conscious awareness. To become aware of and to be able to use the interaction structures in daily life and how to apply them as an intervention, takes time and requires feedback.

Research Design

This study is an attempt to investigate the effect of EBL interventions on the interaction of three 'client-caregiver' dyads. The clients are three teenagers with ID and behavioral problems, and the caregivers, three university students fulfilling an internship for their study Special Education. Because the interventions consist of regulatory mechanisms, such as entrainment, phase-shifting and phase-synchrony and not in the first place of actions, the measures should capture the change of the system and the effect on the organization of the dyad as a system. The design is therefore constructed as an AB-design: a three-months baseline period will be followed by a three-months intervention period.

As can be learned from the study of Chappell and Sander (1979), the interaction can be measured at two different levels, by means of biorhythmicity and cybernetics. Biorhythmicity as a measure provides insight in the organisation of the system. How is the organization of the dyad distributed? Is one of the actors more in charge of leading the system into the conversation, or is one actor always following? Because both partners used speech during their meetings, talkative behavior is used as a measure of synchronization. It is present in all sessions and can serve as the background context in which other behaviors occur.

Cybernetics is measured at the level of the dialogue itself and analyses are conducted with respect to separate and sequential behaviors of the two actors. The dyadic conversation can be analyzed in terms of initiative and response behavior of the interlocutors. An overall conclusion can be derived with respect to dominancy: who is the most dominant or submissive actor in the interaction? More importantly is again the process of change of this dominancy. Will the actors behave differently during the intervention period, than before? Will they use different turn types during their conversation? Finally, what is the effect of the interventions on the organization of the system?

The three main research questions are: does a change of the organization occur due to the intervention, will the actors change their behavior during their interaction and conversation, and can this change be measured by means of the chosen measurements?

Materials and Methods

Participants

In June 2009 all second-year Special Education students of the University of Nijmegen, participated in a presentation about the different possible workplaces they could sign up for to fulfil their obligatory internship during their third-year. After the presentation all students were asked to enrol in a workplace that appealed to them most. A group of nine students volunteered to participate in a research project about the investigation of the effect of a yet unknown treatment, Emerging Body Language.

In cooperation with a residential setting for youngsters with below average cognitive capacities and severe behavioral problems, nine clients were chosen to participate in this research project. This institute is located in the southern part of the Netherlands and is of average growth. A first screening was made based on dossier files, information of the responsible practitioners and problematic behavior of the client. Final participation of the clients was based on informed consent of clients and parents (or other legal representatives). The parents or legal representatives were told that their child would get additional treatment of students who will spend extra time with their child. Clients and parents had given written permission for this research project and for making video recordings of the sessions with the student. The dyads were formed based on expectations of a naturally fit between the youngster and the student, advised by the pedagogues of the residential groups.

The entire group of nine client-student dyads followed the compulsory EBL-program from October 2009 to May 2010, and in June 2010, the data of three client-student dyads were chosen for further research. The choice for these three dyads was based on the videotaped material, which had to be suitable for further investigation. The material was screened on sound quality, the quality of the picture of the videotapes, the description of the student's interventions and activities, and the videotaped material had to contain material that consisted of baseline and intervention sessions that were acquired over an extended period.

The clients, of the three selected client-student dyads, included a 13-year-old Dutch girl, a 15-year-old Dutch boy and a 14-year-old Chinese boy. All three lived in the already mentioned institute and all three lived in the same group. The students were three Dutch third-year students of the University of Nijmegen, all female. Their age varied between 21 and 24 years.

Procedure

The project started in October 2009 and lasted until May 2010. During the first three months the students followed a weekly course on the EBL treatment about the theoretical background of this method. In the meantime, the students were obliged to spend one hour a week with their designated child and they had to

videotape this meeting. The initial aim was to have a pleasant time together and the dyads were free to choose how to be engaged in these meetings. This varied from drawing pictures, to play with Lego or dolls. This period was the baseline period of the intervention. Although the students were provided with theoretical background of the EBL treatment during the baseline period, it was expected that real changes should arise only after instructions had been given about specific interventions appropriate for each dyad.

At the beginning of the intervention period in January, the EBL-expert analyzed the videotaped recordings of the sessions between the student and the client. Based on this material she diagnosed the gaps in the layers and set up an intervention for the students to conduct. From January up to April the videotaped material was used by the EBL-expert to provide the students with weekly feedback on their performance with the child and to give them suggestions for adequate intervention. The students continued their weekly meetings with their child up to May and practised the proposed intervention. They also had to videotape these meetings. These sessions were registered as the intervention period.

After the data collection had been finished in May 2010, three out of nine dyads were chosen for this research project according to the strategy mentioned above. The next step was to choose six sessions out of all the videotaped sessions, three baseline and three intervention sessions. Criteria for inclusion were audibility of the conversation, visibility of both partners, quality of the recorded material, the kind of activities during the baseline should match the kind of activities during the intervention and no disturbances from the environment should occur during the sessions. From every session eight minutes (480 seconds) were selected for further analyses, based on the most representative or meaningful part of that session.

Materials

The 18 x 8 minutes videotaped material was scored by two master students, including the author of this article. They used The Observer XT (Noldus, 2009), professional software for the collection and analysis of observational data. Each assessor scored 9 x 8 minutes of the recordings, and rated 20% of their partner's data as well. A time-window of 1 second was used to calculate the interrator reliability, meaning that agreement was reached when the same behavior was scored within a time-interval of 1 second. A mean reliability of Cohen's Kappa of 0,66 was achieved over all sessions. The most important deviation between the two assessors was their difference in speed at which they rated the same behavior; one assessor could rate the same behavior quicker or slower than the other one. A time-window of 2 seconds would increase Cohen's Kappa. Table 1 presents the results of the interrator reliability and Cohen's Kappa.

Table 1: Cohen's Kappa

	Client A	Client B	Client C
Baseline 1	0,70	0,72	[1]
Baseline 2	0,60	0,61	0,41

Baseline 3	0,67	0,78	0,60
Intervention 1	0,71	0,79	0,55 (0,63)[2]
Intervention 2	0,72	0,64	0,76
Intervention 3	0,51	0,78	0,60
Mean	0,65	0,72	0,58 (0,60)[3]

[1]The assessors rated this film together.

[2] With a time-window of 2 seconds Kappa increased to 0,63 for this film.

[3] When a time-window of 2 seconds is used for the recording of Intervention 1, the mean increased to 0,60.

Linell

The videotaped material was rated according the method of Linell, an Initiative-Response analysis (henceforth IR), which aims to capture dominance and coherence in the interaction of two interlocutors (Linell, Gustavsson, & Juvonen, 1988). According to Linell et al. dominance in a dialogue is a matter of controlling the territory, the interactional space shared by the partners and it intends to gain a large proportion of 'the ground' at one's disposal. Dominance is not to be confused with power. Power is not always expressed in dominant behavior; talkativeness can be a sign of powerlessness, as can resistance to talk force the other interlocutor to take strong measures in the interaction, which emphasizes that the power of the interaction is in the hand of the most subordinate person. The analysis of Linell goes beyond categorizing units of dialogue and comparing actors with regard to category frequencies, it tries to characterize the dialogue of a particular dyad on a scale of symmetry-asymmetry.

The coding system of Linell is based on the analyses of turns during a dialogue. These turns can hold a response as a reaction on the previous turn or an initiative, anticipating the next turn, and of course all sorts of combination. In a sense, initiatives point forward to the next turn, and responses point backwards to the previous turn in the dialogue. Initiatives bring forth the conversation and responses create coherence with the preceding turns. Each turn of the dialogue is assigned to a particular turn category. A complete list of the 18 possible categories is given in the Appendix, *Table 1d*.

The category system is based on a small set of initiative and response features. The features are the following: 'initiative-response', 'strong-weak initiatives', adequate-inadequate responses', 'local-nonlocal responses', 'focal-nonfocal responses' and 'alter or self-linked responses'. These 18 categories can be ordered on a six-point ordinal scale from the strongest initiative with no response at all, to the weakest response without any property to promote the conversation any further. An example of this scale, the *IR-profile*, is presented in *Figure 1d* in the Appendix. The IR-profile is the overall measure to determine which partner is most dominant. The scores form the basis for calculating IR-indices, IR-differences and other derived measures.

Measures

The aim of the EBL intervention is to bring a change in the pattern of interaction between two partners. The method of Linell contains a variety of measures to visualize the dyadic interaction. It distinguishes three different dimensions of dominance: quantitative dominance, topical dominance, and interactional dominance. Although all three measures will be briefly introduced, in this study only quantitative and interactional dominance were used to measure the changes of the dyadic interaction.

Quantitative dominance is a matter of the amount of speech produced in the interaction. He who uses the most words or talks most of the time is the most dominant partner. This measure is expressed in the amount of seconds during the rated interaction.

Topical dominance has to do with who places the most topics on the floor, the content of the interaction. It measures the amount of locally new content words. In the study of Linell et al. (1988) topical dominance correlated highly with quantitative dominance. This explains why topical dominance should not necessarily be measured. What's more, no significant correlation was found, between amount of speech and interactional dominance, which underpins the different dimensions of dominance.

Interactional dominance is about communicative actions, and measures the amount of initiatives and responses. The most dominant partner is the one who is able to control the actions of the other interlocutor to the greatest extend and who avoids being controlled or directed by the other partner. Apart from the IR-profile and its derived measures, a combination of turn types is used to analyse the dialogue, called *coefficients*. In Table 2 all measures of interactional dominance and a brief explanation are presented.

Table 2   Measures of Interactional Dominance

Measures	Content
IR-profile	From every speaker the frequency of all turns is determined. A summary of this is presented in the IR-profile.
IR-index	Overall measure of the extent to which a partner dominates or is dominated by the interlocutor. The IR-index is based on the median of his scores on his IR-profile.
IR-difference	The difference between the two IR-indices determines the IR-difference and is a measure of asymmetry of the dialogue.
B-coefficient (B = Balance)	The number of expanded responses (category B) as a percentage of all turns.
S-coefficient (S = solicitation)	The number of questions containing strong initiatives as a percentage of all turns (categories A, C, F, I, K, M).
F-coefficient	The number of turns that are not locally coherent as a percentage of all turns (categories C, D, F, G, H, Q). These turns consist of abrupt

(F = fragmentation)	topic shift.
O-coefficient (O = obliqueness)	The number of turns that avoids to link up with the main content of the previous turn (categories I, J, K, L, M, N). These turns are also used to score monologues.
E-category	The number of turns that lack any initiative (category E).

Interpersonal coordination

In addition to Linell measures, the interpersonal coordination will be measured by means of Cross Recurrence Quantification Analyses. It measures the synchronisation between two persons, and it gives insight information about the dyad as a system and how the actors react on each other. It is the reflection of the biorhythmicity of the system. Talkative behavior is measured as the interpersonal coordination.

Strategy for Analyses

Linell measures

The measures of Linell were analysed and calculated by means of the Observer XT program. Of every turn category of both interlocutors, its frequency, percentage, and total time in seconds were calculated and displayed in bar charts and compared with the other partner. The results of the analysis, the description and the discussion of the Linell measures are presented in the three vignettes in the Appendix. In the result section a comprehensive summary will be given of all dyads under investigation.

CRQA

In the early ninety's of the past decade a new technique has been discovered and developed to measure synchronization of a system: Cross Recurrence Quantification Analysis (Webber & Zbilut, 1994). Whilst Condon and Sander (1974) had to measure timing of movements and rhythmic of listener and speaker by hand scoring videotapes, thanks to CRQA the dyad under study can objectively be analyzed in terms of recurrent behavior. According to Webber and Zbilut, recurrence is a property of living and non-living systems and reflects the underlying dynamic of the state of change of a system. In the already mentioned study of Shockley, Santana and Fowler (2003), postural sway is analyzed by means of CRQA. In this present study, CRQA is used to analyze interpersonal coordination of talkative behavior. The results are presented slightly different than is normally the case, because recurrent behavior in a conversation means speaking at the same time or being silence at the same time, and a synchronised conversation means talking in succession. When recurrent behavior decreased, it means that one person ends the recurrent state of 'being silent at the same time' and starts talking, or the other way around, stops talking when both actors are speaking at the same time. This explains the downward peaks in the presentation of the results. The line in the middle of the panel is the line of synchrony. It reflects after how much time recurrent behavior occurs; in this study

it means after how many seconds the second interlocutor follows the initiative of the first partner to start or stop a conversation. CRQA has proven to be a powerful tool in the measurement of dynamical and biological systems. In the remainder of this study, I will refer to the dyad as Client-Therapist dyad, because it signifies the function each of the members in the dyad has.

Results

Dyad 1: Client A – Therapist 1

Integrative picture of client A

Client A is a 15-year-old teenage boy with below-average cognitive capacities (WISC-III 2006: TIQ 80). He is diagnosed with ADHD and ODD. A psychiatrist estimated his social and emotional development between 12 and 18 months.

He regularly displays verbal and physical aggressive behavior towards other clients and caregivers. He suffers from tics: tapping with his fingers, making noises. The synchronisation of his body is unbalanced: his speech is so fast, that it is almost unintelligible, his fine motor skills are underdeveloped and his gross motor skills exists of coarse and clumsy movements. He prefers to play on his own, when he plays with others he usually tells them what to do and displays bossy behavior. He has difficulties to concentrate on other people when he is in a group. In one-to-one situations he is more able to listen to others. He needs caregivers to structure his activities, to help him in the interactions with others and to regulate his emotions.

From the perspective of the EBL treatment, the client experiences difficulties in attunement and turn-taking, layer A and B of the EBL model. In this case it means that he is not able to synchronize his own movements with his own actions (he, for example, talks faster than his lips can coordinate), and he is also not able to synchronize his movements with the movements of other people (layer A). Speaking with Condon: the client has difficulties in self-synchronization and interactional synchronization. As a result, he is mostly unaware of the reactions of other people and how they are related to his own actions. He also has a problem with turn taking in the interaction with other people (layer B). He is not only unable to synchronize at the same time, but cannot synchronize with the other either in taking turns. He does whatever he likes and does not even realize that others might have other plans or ideas.

EBL intervention

The main purpose of the EBL treatment is to change the usual way of the client in the interaction with others. The client lacks some important elements in the interaction with others and is not aware of that. The therapist has to bring in these new elements and that way has to elicit new behavior of the client.

Goals:

1. The client becomes aware that every action has a certain rhythm and that it is possible to synchronize one's movements with others.
2. The client becomes aware of another person during the interaction (here: the therapist).

Procedure:

1. When the therapist and client undertake some activities together, such as talking, biking or walking, the therapist aligns her rhythm with the rhythm of the client for a few seconds, than she takes a break and retakes her own rhythm again. If necessary, she will repeat this procedure. It is expected that during the break the client recognize the difference in the alignment of rhythm before and during the break and it is expected that he wants to restore the alignment of rhythm again. He shall adapt his pace to that of the therapist. This procedure will be repeated every time the client is talking, biking or walking out of rhythm with the therapist.

2. A prerequisite to become aware of another person during an interaction is a first awareness of the possibility to synchronize one's movements with others. When this first awareness has been established, the therapist can 'play' with it and force the client to take notice of her. Every time the client is pushing his will and wants to do activities his own way, the therapist will deliberately stop with the activity she is doing with the client. She waits until the client becomes aware that she is not joining the activity anymore. When the client asks her to join the play again, she explains that she wants to participate and not just want to obey orders. When he gives her the opportunity to bring in some ideas of her own, she rejoins the activity again and restores the alignment.

Results of the intervention

The client's main problem is his inability to synchronize his movements with another person, resulting in bossy and dominant behavior because of an insufficient awareness of the other person. The intervention has focused on these two problems and intended to bring a change in his way of interacting with others.

The quantitative dominance of the client has changed over the six sessions. From the third baseline session, the therapist has become more dominant in the amount of speech. She has gained more 'ground' to her disposal and forces thus the client to take more notice of her (Figure 1a).

The interactional dominance will be discussed by means of several categories that distinguish between the different dimensions of this dominance. One possibility of displaying dominance is to make use of turns in which the interlocutors explicitly try to force or demand the other partner to respond. The therapist is the most dominant partner in this respect; she is more proactive and explicitly solicits for a response of the client in all sessions (Figure 2a). Notable is the fact that the interlocutors react in reverse, every time the therapist uses strong initiatives or questions, the client uses them less and vice versa. However, the pattern seems to change from the second intervention session. The therapist remains stable at this point and the client is inclined to use fewer turns that contain strong initiatives. This change coincides with an increase of the amount of turns that allows the conversation to progress (Figure 3a). It seems that the client is able to change his tone from demanding towards inviting a response. On the whole, the interaction seems to have grown from a question-answer interview to a more equal conversation. Both partners have become equally responsible for ending a topic

from the third baseline session. No one in particular is responsible for ending the conversation; the interaction seems rather balanced in this respect. The synchrony of the dyad's interaction pattern is also very obvious in the amount of turns both interlocutors use in changing the topic of the conversation or in using monologues; the patterns of both partners follow exactly the same trend for both turn types (Figures 5a and 6a). A summary of all these different categories is given in the IR-indexes and IR-difference. It is remarkable that the dyad has grown from relatively strong asymmetry during the baseline sessions to a more symmetrical dyad during the third intervention session (Figure 7a and Table 2a).

Another possibility to measure the synchrony of the dyad has been conducted by means of CRQA-measurements. Figures 8a and 9a display which partner is most likely to lead the dyad in starting or ending a conversation and which partner is most likely to during the baseline and intervention period. The best conclusion that can be made based on these results is that the pattern has changed before and during the intervention. The therapist is most likely to lead the dyad in turn taking behavior, ending up in synchrony at the end of the baseline period. However, during the intervention the dyad has become less synchronized with respect to turn taking behavior. This might be seen as a drawback, but can also be interpreted as the emergence of new behavior to which the dyad is experimenting, the phase-shifting state of the system. One of the goals of the intervention is to elicit turn taking behavior of the client, based on the experience of synchrony. This might be the case here. The client is leading the dyad for the first time in starting a conversation, during the third intervention session. A sense of awareness of the other person might emerge. Unfortunately, because of lack of further data, no firm conclusion can be drawn.

Evaluation

The most important problem of the client, from an EBL perspective, is his inability to interact with others in an equal way, because of a lack of awareness of the presence of others. This lack of awareness has resulted in the client's bossy behavior that he is unaware of. A very first step in the emergence of awareness of others is to experience synchrony in rhythm with the self and others. The therapist has brought in elements of synchrony and rhythm during the intervention period. The above-mentioned results seem to indicate a change in the pattern of the client and the emergence of new behavior. The dyad has become more symmetrical with respect to interactional dominance and the conversation has grown into a balanced conversation, in which both partners are able to start or end a conversation and both are capable to open up the conversation and allow it to progress. The client has experienced to lead the dyad in turn taking behavior in the third intervention session, which provides hope for further development.

Dyad 2: Client B – Therapist 2

Integrative picture of client B

Client B is a tiny 13-year-old girl with below average cognitive capacities (WISC-III 2006, TIQ 60, VIQ 69, PIQ 58). She is diagnosed with Reactive Attachment Disorder. According to a psychiatrist, she has severe delays in social, emotional, and

physical development. He estimated her emotional development between 12 - 24 months.

At the age of 5, the client and her parents came under supervision of youth care, because of serious neglect by parents. A year later the client was placed in a foster home and moved to another foster family half a year later. At the age of 10, the foster family indicated that they are no longer able to give the client the care and the attention she needs and they like to end the foster care. The client was finally referred to the institution.

The main behavioral problems that foster parents (and other professional caregivers) experience in contact with the client are due to the attachment disorder. The client very much needs and seeks contact with others and easily drives her caregivers to exhaustion, because of this clinging behavior. Her classmates and peers reject her. Her strong focus or orientation towards others, has led to an insufficient development of her own personality. This means that she barely takes initiatives and has no opinion of her own. In relation with others she shows socially adaptive behavior, she never argues but always wants that others consider her to be nice and friendly. She is focused on pleasing other people and has insufficient awareness of her own self. She has problems recognizing her own sensations, such as emotions and feelings, or hunger and thirst. She has idea of time, seasons, and rhythm of the week or everyday life. She needs caretakers to give meaning to her sensations, to regulate her emotions and to help her structure her daily life.

From the perspective of the EBL treatment, the client experiences difficulties in attunement, layer A of the EBL model. In this case it means, that the client experiences no distinction between herself and others and her environment. As a result she lacks self- awareness, which bring forth the already mentioned problems.

EBL intervention

Goals:
1. The client develops a sense of self-awareness.
2. The client becomes more assertive towards others.

Procedure:
1. - The therapist wants the client to become aware of the distinction between her and others. The therapist gives her opinion about 'everything' she sees in the room and about her experiences during the play with the client. She asks the client about her opinion too.
   - The therapist creates situations in which the client has to choose something. The therapist takes care not to tell her what to do or choose, but waits until the client has made a decision.
2. The therapist takes a wait-and-see attitude in contact with the client. She waits until the client takes initiative in the interaction and becomes more dominant in the interaction with the therapist.

Results of the intervention

The main problem of the client is her strong orientation towards others, which has led to an insufficient sense of awareness of self. The treatment aims to provoke a sense of distinction between the client and the therapist. The results

should indicate that a new pattern is emerging in the interaction of the client with the therapist.

The client is most dominant with respect to quantitative dominance. She talks the most during all sessions (Figure 1a). This result appears to contradict the analysis based on EBL that she lacks initiative and self-awareness. However, as can be learned from the description of the client's behavior, the client also displays clinging behavior, which explains the results with respect to quantitative dominance. The treatment has not seemed brought about a change in this pattern.

Interactional dominance is about the content of the interaction and the type of turns both interlocutors use. Overall, the therapist is most dominant in asking direct questions and in the use of turns that hold strong initiatives. Most promising is the result of the third intervention, in which both partners are equally dominant in their use of this turn (Figure 2b). When additional data would have been available, it should be very interesting to see whether this equality stabilizes over time. Another important turn in the conversation is the use of turns that consists of expanded responses. The use of this turn means that interlocutors are capable to expand the conversation, without specifically demanding the other partner to respond. The client has used this turn a lot more during the intervention sessions, in comparison with the baseline sessions (figure 3b). By using this turn, the client shows that she is more capable to open up the conversation and to allow it to progress by introducing new information into the conversation and thus by acting more assertive. This coincides with the client's downward trend of the percentage of turns that lack any initiatives (Figure 4b). The patterns of the therapist and the client, with respect to turns that consists of abrupt topic shifts, are almost identical from the third session of the baseline onwards (Figure 5b). Dominance does not play a role in this type of turns. With respect to the percentage of monologues used by both partners, the client is most dominant (Figure 6b). This matches with the amount of speech the client uses, which already proofed her to be the most dominant partner. Overall, the interactional dominance of the client has been increased over time (Figure 7b). This was one of the main goals of the intervention. The dominance of the therapist has decreased and the interaction of the dyad has become more symmetrical and even a little bit more asymmetrical in favour of the client.

With respect to synchrony and leading and following behavior, the client showed to be most dominant during the baseline sessions in leading the dyad in starting the conversation. The pattern seems to change during the intervention sessions and the dyad becomes more synchronized (Figure 8b and 9b). When it comes to ending a conversation, both interlocutors seems to be responsible, although the client is slightly more dominant than the therapist.

Evaluation

The main effort of the intervention was focused on developing a sense of self-awareness at the client. The results suggest that, on the whole, this effort has been succesful. The client has become more dominant in the content of the interaction, the interactional dominance. She has learned to use more turns that opens up the conversation and thus expand it and she has used fewer turns that lack any initiative. On the other hand, the client is used to seek contact with others, which is expressed in starting a conversation and do a lot of talking, but the CRQA

results suggest that synchronization in the pattern of leading and following is possible and has already occurred. The results are most promising for further growth of the emotional development of the client.

Dyad 3: Client C – Therapist 3

Integrative picture of client C

Client C is a 14-year-old Chinese boy with below average cognitive capacities (WISC-III 2007: TIQ 74, VIQ 67, PIQ 86). He was diagnosed with PDD-NOS in 2004. The family has a long history with professional workers from youth care and schools. At the age of 4, diagnostic tests found a delay in his social and emotional development. The main problem is that the client reacts mainly from his own perspective. He is unaware of the feelings and thoughts of other people, in general, or caused by his (unfriendly) behaviour. He has no experience in togetherness with others, has no friends, likes to tease classmates, threatens his mother, fights with his little sister and does not show any regret afterwards. He does not share his doings, feelings or thoughts with others. He avoids making eye contact with others and has difficulties in starting or maintaining a conversation. He needs caretakers to structure his interactions with others and prevent him to lose himself in conflict situations. He shows rigid problem-solving behaviour, he is inclined to stick to just one solution when fulfilling a task. His gross motor skills seem stiff, while his fine motor skills are not age-appropriate and his facial expression is flat.

From the perspective of the EBL treatment, the client experiences difficulties in attunement, turn-taking and exchange, layers A, B and C of the EBL model. In this case it means that he has problems to synchronize with others and to attune to others (layer A). Because of this, he also has problems in turn-taking behaviour and to align his rhythm with others in succession. He knows how to make contact in an unfriendly manner, but he has no experience how to do things together in a pleasant way (layer B). As a consequence of this, he is also unable to exchange or share his doings, emotions or thoughts with others, and to experience a variety of emotions, feelings, thoughts and solutions, which is the next step in the social emotional development (layer C). This causes his rigid behaviour and his eagerness to stick to one solution only, his solution.

EBL intervention

The main purpose of the EBL intervention is to bring in new elements in the interaction pattern of the client-therapist dyad, which hopefully invites the client to react in a different way than he is used to and to establish a new and more adequate pattern of interaction with others.

Goals:
1. From an awareness of togetherness with the therapist, the client is invited to bring in a small variation in their interaction or play. He is capable to think about and to accept a variety of ways of playing a certain game (layer C).
2. The client experiences turn-taking in the interaction with the therapist (layer B).

3. The client is able to exchange his thoughts and feelings with the therapist (layer C).

Procedure:

1. The therapist introduces a game they can play together. She only gives one rule or purpose for the game, she then leaves room for the client to come up with a variety of ways to play the game while following the one rule.
2. The therapist tells the client about her experiences in the past week. She invites him, without specifically asking, to do the same and to share his doings of the past days with her.
3. During their weekly meeting, the therapist shares her thoughts and feelings about the activity they are doing: "I like this game". She will not ask questions to urge the client do the same, but she will take a break and silently invites the client to share his thoughts and feelings too.

Results of the intervention

The intervention of the EBL treatment intends to bring a change in the pattern or style of interaction of the client with others. This change can only be achieved when a different way of interacting is initiated by another person, in this case the therapist. It is the therapist's task to change her style of interaction with the client and to invite him indirectly to change his style as well.

One of the most striking patterns of the client in the interaction with others is his inability to tell others about his doings, feelings, and thoughts. In the baseline sessions it became clear that the client only talks when he is asked, the conversation style has is that of an interview. This pattern changed during the intervention period. The therapist was told not to ask so many questions anymore (Figure 2c), but just tell him about her doings (Figure 6c). As a result, the client takes the initiative to tell the therapist about his doings in the last week, without being directly asked (Figures 1c and 6c). As can be seen from the Figures 2c and 3c, the therapist reduces the amount of questions that contains a demand to respond and increases the number of turns that held an invitation to respond. Figures 4c and 5c clearly show the coupling of the interlocutors in their interaction. Both partners react on each other, either with an opposite reaction or with the same reaction. This coupling is really necessary and important, because it shows that the client is able to react on the therapist and it suggests a sense of awareness of the other person in the interaction.

The therapist shows the most initiative and quantitative dominance in this dyad. This asymmetry remains visible in all sessions (Figures 1c and 7c). She is the most dominant in the content of the interactional turns and in the amount of speech used.

Figures 8c and 9c show, however, the underlying state of the system. The data suggest that the dyad becomes more synchronized and that the client is able to respond quicker.

Evaluation

The results of the data suggest that the pattern of the interaction of the client with the therapist is about to change or has already changed during the

intervention period. The main goal of the intervention, to help the client to tell others about his doings and feelings, seems to have been achieved. The client seems to be more adequate in his responses, quicker and capable of starting a conversation.

Discussion

In this study the interaction between a client and a therapist were closely examined, with respect to their mutual conversation. The initial aim was twofold, the investigation of a change in the organization of the dyad studied as a system, and the change of patterns of observable behaviours of both actors during their dialogue, due to EBL interventions. Added to this, was the question whether the changes could be observed by means of the chosen measurements.

With respect to the first question, the results measured by CRQA showed variation of patterns in the organization of the system before and during the intervention. This was especially the case for dyad A and B. The organization of dyad A seemed to change from synchronization towards less synchrony, what could be interpreted as a change towards phase-shifting due to experimenting with turn-taking behaviour. Dyad B seemed to move towards more synchronization during the intervention period. With respect to dyad C, the overall level of talkative behaviour was apparently too low to measure significant differences between recurrent and non-recurrent behaviour, which might explain the flat lines. However, the results are probably more robust with more data are available.

Regarding the second question, all three dyads seemed to have been successful in the achievement of their goals. Linell measures showed changing of patterns for some of the measures of every dyad. Not all the analysed turn-types showed clear-cut changes, but surely the main goals for each dyad were achieved. It was interesting to note that some of the changes appeared during the third baseline, before the intervention really started. This might be due to the case that the therapists were provided with information about the EBL treatment during the baseline and started to implement their knowledge unwillingly and perhaps even unknowingly. Another possible explanation is that, due to the weekly attention and growing trust between therapist and client, different behaviour emerges naturally. Future research is needed to rule out or confirm this hypothesis. An unexpected and surprisingly result, with respect to the Linell measurements, was the observation of synchronization in the patterning of the behaviours of the dyads. The patterning of some turn-categories was completely synchronized, either because they were exactly the same, or because they were just the opposite of each other. This outcome was not foreseen, but gives additional information about the synchronization of the system. These results showed even more clearly that the dyad should be regarded as a system, constantly acting and reacting. The intervention had its effect on both interlocutors.

With respect to future research, a few comments are worth mentioning. This pioneering study is based on a small sample of six times eight minutes extended over a period of eight months. The decision to construct the design this way was partly based on practical limitations, but also on the uncertainty of the adequacy of the chosen measurements. Now they have proven to provide insight in the organization

of the system and the behaviours of the dyad, a larger sample should empower the results. This means not only increasing the number of minutes to be analysed, but also the expansion of the number of videotaped encounters, particularly during the intervention period. It is necessary to observe the organization of the system over a longer period of time, to be able to see how the system develops and whether the temporal change lasts.

Secondly, the results showed, that the nature of the dyad's meetings co-determined the outcomes: talkative behaviour during a game on the computer or playing with Lego is inherently differently. To overcome this problem, the same type of activity should be analysed over time, drinking tea, for example. When the activity is similar, the conversation may then be analysed with respect to the change in the patterns during the interaction, without the effect of different activities on the interactional pattern.

In the third place, as mentioned before by Chappell and Sander (1979), data should be regarded in a holistic way, when examining dyads as a system. Linell, Gustavsson and Juvonen (1988), underscored this statement in their study. They argued that the quantitative account is part of the whole dialogue and the same outcomes may arise in different ways and situations. A clear example is found in this present study at the third dyad. The amount of speech produced by the therapist and the client during the third baseline and second intervention meeting, is almost the same (Figure 1c, Appendix). The description of the situation, however, clarifies that the form of their conversation has changed completely: From an answer-question-like interview to a more balanced conversation about a certain topic. Linell, Gustavsson and Juvonen recommended users of the Linell method to take into account more of the ecology of communication and to apply a more qualitative analysis.

Finally, the combination of the chosen measurements and methods of analysis appear appropriate to reveal the underlying dynamics of the system, the biorhythmicity. Moreover, it provides information at the level of observational behaviours. Future research surely might expand and replicate this design, because the main concern of scientists and practitioners should be to support the development of promising treatments and to provide them with sound scientific evidence.

References

Bosman, A.M.T. (2008). *Pedagogische Wetenschap. Koorddansen tussen Kunst en Kunde,* pp. 22-26. Inaugurele rede. Hilversum: Uitgeverij Eenmalig.

Bowlby, J. (1969). *Attachment and loss, vol. 1.* New York: Basic Books.

Chappell, P.F., & Sander, L.W. (1979). Mutual regulation of neonatal-maternal interaction. In M. Bullowa (Ed.), *Before Speech: The beginning of interpersonal communication* (pp. 89-109). Cambridge: Cambridge University Press.

Cohen, H., P., Amerine-Dickens, M. & Smith, T. (2006). Early Intensive Behavioral Treatment: Replication of the UCLA Model in a Community Setting. *Journal of Developmental & Behavioral Pediatrics*, 27, S145 - S155.

Condon, W.S. (1970). Method of micro-analysis of sound films of behavior. *Behavioral Research Methods and Instrumentation,* 2, 51-54.

Condon, W.S. (1979). Neonatal entrainment and enculturation. In M. Bullowa (Ed.), *Before Speech: The beginning of interpersonal communication* (pp. 131-148). Cambridge: Cambridge University Press.

Condon, W.S., & Sander, L.W. (1974). Synchrony demonstrated between movements of the neonate and adult speech. *Child Development,* 45, 456-462.

Einfeld, S.L., Piccinin, A.M., Mackinnon, A., Hofer, S.M., Taffe, J., Gray, K.M., … Tonge, B.J. (2006). Psychopathology in young people with intellectual disability. *Journal of American Medical Association,* 296, 1981-1989. doi: 10.1001/jama.296.16.1981

Embregts, P.J.C.M., Didden, R., Huitink, C., & Schreuder, N. (2009). Contextual variables affecting aggressive behavior in individuals with mild intellectual disabilities who live in a residential facility. *Journal of Intellectual Disability Research,* 53, 255-264.

Embregts, P.J.C.M., & Grimbel du Bois,M. (2005). Nergens thuis. *Tijdschrift voor Orthopedagogiek,* 44, 24-27.

Emerson, E. (2003). Prevalence of psychiatric disorders in children and adolescents with and without intellectual disability. *Journal of Intellectual Disability Research,* 47, 51-58.

Grey, I.M., Hastings, R. & McClean, B. (2007). Staff training and challenging behaviors. *Journal of Applied Research in Intellectual Disabilities,* 20, 1-5.

Kandel, E. R., & Hawkins, R. D. (1992). The biological basis of learning and individuality. *Scientific American, 241,* 66-76.

Linell, P., Gustavsson, L., & Juvonen, P. (1988). Interactional dominance in dyadic communication: A presentation of initiative-response analysis. *Linguistics, 26,* 415-442. Doi: 10.1515/ling.1988.26.3.415

Lovaas, O.I., Koegel, R. L., Simmons, J. Q., & Long, J. (1973). Some generalization and follow-up measures on autistic children in behavior therapy. *Journal of Applied Behavior Analysis*, 6, 131–166.

Marsh, K. L., Richardson, M. J., & Schmidt, R. C. (2009). Social connection through joint action and interpersonal coordination. *Topics in Cognitive Science, I,* 320-339.

Maturana, H. R. & Varela, F. J. (1998). *The tree of knowledge.* Boston & London: Shambala Publications Inc.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 2,* 247-259.

Newsletter Euregionaal Congresburo, June 2010. Retrieved on June 17, 2010, from http://www.congresburo.com/agenda.php?id=20

Noldus (2009). *The observer XT*. Wageningen, The Netherlands: Noldus Information Technology.

Ouellette, J., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124,* 54-74.

Pavenstedt, E. (1961). A study of immature mothers and their children. In *Prevention of mental disorders in children: initial explorations,* ed. G. Caplan, pp. 192-217. New York: Basis Books; London: Tavistock. 90.

Paventstedt, E. (1964). Description of a research project on the influences of the maternal character structure on the development of the child's personality. *Japan Journal of Child Psychiatry,* 5, 19-28. 90.

Rutten-Saris, M. (1990). *Basisboek lichaamstaal*. Assen: Van Gorcum.

Rutten-Saris, M. (2001). Leren als een baby. In C. Schweizer (Ed.), *In beeld. Doelgerichte behandelmethoden voor beeldend therapeute*n (pp. 103-146). Utrecht: Bohn Stafleu Van Loghum.

Rutten-Saris, M. (2002). *The RS-index: A diagnostic instrument for the assessment of Interaction structures in drawings*. Academisch Proefschrift. Hertfordshire, UK: University of Hertfordshire.

Rutten-Saris, M., Heijligers, C., & Bosman, A.M.T. (2013*). Emerging Body Language. Een therapeutische methodiek voor de ontwikkeling van Interactie-structuren van kinderen en volwassenen met ontwikkelingsstoornissen en gedragsproblemen*. Ongepubliceerd manuscript/Boek in voorbereiding.

Sander, L.W. (1969). The longitudinal course of early mother-child interaction: cross-care comparisons in a sample of mother-child pairs. In *Foss* 1969, pp. 189-227. 90, 95.

Shockley, K., Santana, M., & Fowler, C.A. (2003). Mutual interpersonal postural constraints are involved in cooperation conversation. *Journal of Experimental Psychology: Human Perception and Performance,* 29, 326-332.

Skinner, B. F. (1953). *Science and human behavior.* New York: Macmillan.

Slot, N. W. & Spanjaard, H. J. M. (1999). *Competentievergroting in de residentiële jeugdzorg.* Baarn: HBuitgevers.

Stern, D. N. (1985/2000). *The interpersonal world of the infant*. New York: Basic Books.

Webber, C.L., & Zbilut, J.P. (1994). Dynamical assessment of physiological systems and states using recurrence plot strategies. *Journal of Applied Physiology,* 76, 965-973.

Appendix: Vignette A

Vignette 'client A – therapist 1' interaction

1. Description client-therapist dyad
   a. Dossier: Client A is a 15-year-old male teenager with below-average cognitive capacities (WISC-III 2006: TIQ 80). He is diagnosed with ADHD and ODD. His social and emotional level of development has been estimated between 12 and 18 months.
   b. Problem behavior: Client A displays verbal and physical aggressive behavior regularly towards other clients and caregivers. The synchronisation of his body is unbalanced: His speech is so fast, that it is almost unintelligible, his fine motor skills are underdeveloped, and his gross motor skills exists of coarse and clumsy movements. He prefers to play on his own, when he plays with others he usually tells them what to do and displays bossy behavior.
   c. Therapist 1 is a 21-year-old woman.

2. EBL intervention
   – Goals:
      3. The client becomes aware that every action has a certain rhythm and that it is possible to synchronize one's movements with others.
      4. The client becomes aware of the other person (in particular the therapist) during the interaction.
   – Procedure:
      3. When the therapist and client undertake some activities together, such as talking, biking, or walking, the therapist aligns her rhythm with the rhythm of the client for a few seconds, than she takes a break and retakes her own rhythm again. If necessary, she will repeat this procedure. It is expected that the client shall adapt his pace to that of the therapist. This procedure will be repeated every time the client is talking, biking, or walking out of rhythm with the therapist.
      4. Every time the client is pushing his will and wants to do activities his own way, the therapist will deliberately stop with the activity she is doing with the client. She waits until the client becomes aware that she is not joining the activity anymore. When the client asks her to join the play again, she explains that she wants to participate and not just want to obey orders. When he gives her the opportunity to bring in some ideas of her own, she rejoins the activity again and restores the alignment.

Description filmed meetings: facts and impressions
 - **Film 1: Baseline, 01-10-2009**
   – Client and therapist have planned to play with the Lego. In the bedroom of the client is only one chair present. The client sits on this chair behind the table with the Lego on it. The therapist is standing next to him. The conversation is about Lego. The therapist asks a lot of questions, apparently to keep the conversation going. The client answers in a very rapid speech, it appears that the therapist understands him. Sometimes the client asks some

questions too. The client plays in his own way with the Lego; he orders the therapist what to do. Both seem to be relaxed during the play.

- **Film 2: Baseline, 26-11-2009**
  – Client is playing soccer, on a game computer. He is lying on the bench. The therapist is sitting on another bench, watching the game. During the game the therapist and client have a conversation about soccer. The client is talking very fast and the therapist had to ask several times to repeat his saying, because she could not understand him. The client talks bossy and determines what the therapist is allowed to do or not, for example, she is not allowed to join the computer game with another controller. The client seems happy and enjoying the play, but the therapist seems frustrated that they cannot play together. She does not say anything about it, however.

- **Film 3: Baseline, 07-01-2010**
  – The client and the therapist are cleaning up the bedroom of the client. The client is talking in a bossy way and orders the therapist what to do: "Put the table in the corner". The therapist obeys without giving any comments. It seems as if the client is the prince and the therapist is his maid. The therapist does not seem to bother this very much.

- **Film 4: Intervention, 04-03-2010**
  – The therapist and the client are both playing soccer on a game computer. The client puts on some music the therapist does not like. She asks if he can turn down the volume a little bit. The client listens to her immediately. The client explains the game to the therapist and tells her how to play it. The therapist wants to play another game, when it is over. The client resists a little bit, but finally gives in. The client seems to be more aware of the therapist than during the baseline. Both make jokes, both ask questions, both talk in an easy and quiet way.

- **Film 5: Intervention, 04-03-2010**
  – Client and therapist have planned to play with the Lego in the bedroom of the client. The therapist proposes to organize the room in a certain way, so they can easily play together. The client forbids her to change anything and orders her to move away from the table. The therapist immediately stops the play and takes out her own book of her bag and starts reading. The client seems surprised, and then tells her that he does like her to join the play again and invites her in again. After this intermezzo the conversation is much more friendly. The client tells the therapist that he is happy with the new ideas she is bringing into the game. They both have their own role in the play, but they work together at the same project.

- **Film 6: Intervention, 18-03-2010**
  – The client and the therapist are playing with cars together. The client is the salesman; the therapist is a buyer of cars. They equally participate in this game. Whenever the client talks very fast and unintelligible, the therapist answers in the same speed by telling him that she cannot understand him in this way. She then takes a break and waits for reaction. The client repeats his sentences in a much slower speed. The play seems very pleasant, both laugh a lot; both seem to enjoy the game.

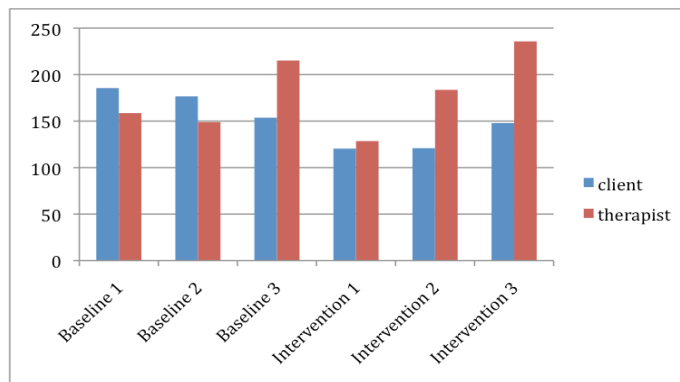## 4. Interactional parameters of Linell

Figure 1a. The amount of speech produced in seconds as a measure of quantitative dominance (n= 480).

Quantitative dominance, as a matter of 'who talks most of the time', is presented in Figure 1a. It shows that the therapist has become more dominant in the amount of speech she uses in the conversation, especially during the intervention period. The client was more dominant during the first two sessions of the baseline.

The *interactional dominance* will be discussed by means of several categories that distinguish between the different dimensions of this dominance. In Table 1a the absolute numbers of each category is presented.

Table 1a. Distribution of Total Numbers of Categories of Interactional Dominance

	Total number of turns	The number of expanded responses (B)	The number of turns which lacks new initiatives (E)	The number of abrupt topic shifts (F)	The number of turns that avoids to link up with the main content of the previous turn (O)	The number of questions or strong initiatives (S)
Client						
Baseline 1	117	18	37	26	18	6
Baseline 2	94	28	14	23	14	18
Baseline 3	114	40	21	21	19	15
Therapist						
Baseline 1	112	13	25	13	28	38
Baseline 2	94	24	29	5	9	18
Baseline 3	118	20	22	19	18	32
Client						
Intervention 1	94	22	12	16	28	17
Intervention 2	88	34	9	14	20	12
Intervention 3	98	51	19	19	5	8
Therapist						
Intervention 1	82	20	11	13	19	18

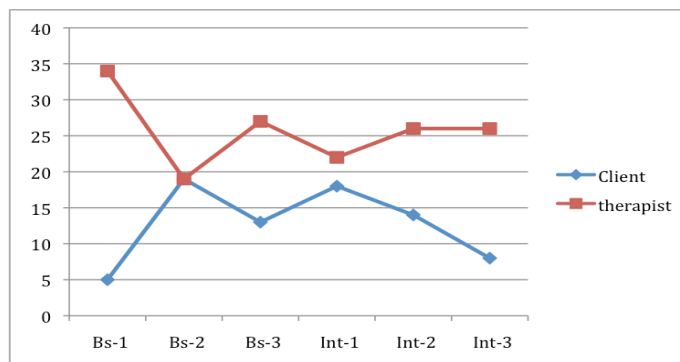|					
Intervention 2	85	17	11	16	13	22
Intervention 3	101	26	16	16	11	26

Figure 2a. Percentage of turns, that consists of questions or strong initiatives (S-coefficient).

Figure 2a displays the percentage of all turns that involve questions or other strong initiatives. It shows how often the partners explicitly try to force their interlocutors to respond. The most striking feature in this figure is the fact that interlocutors react in reverse. When the therapist takes more initiative, the client takes less and vice versa. The therapist takes most strong initiatives in all sessions. It seems that she has reached a stable level over time and she uses this type of turns in 25 percent of all turns. The client uses these turns more variable and even seems to reduce them during the intervention period.

In Figure 3a an upward trend is visible in the number of expanded responses the client uses during the conversation and this trend becomes more obvious during the intervention period. This means that the client is able to contribute to the progression of the conversation and that he is learning to take turns with the therapist.

Figure 3a. Percentage of expanded responses (B-coefficient)

In Figure 4a the counterpart of the B- and S-coefficient is presented, the E-category. These turns display lack of initiative and they will end the particular topic of the conversation. To start the conversation again, a new topic should be brought forward by one of the interlocutors. The results appear to show some stabilization in the use of these turns during the intervention period. Both partners are equally responsible for ending a topic; they used it between 10 and 20 percent during the

intervention period, unlike 15 to 32 percent during the baseline period. These results suggest that the interaction has grown from a question-answer interview into a conversation.
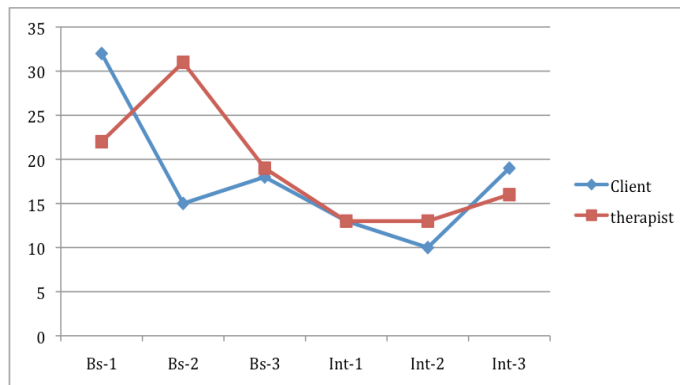

Figure 4a: Percentage of turns that lack initiative (E-category).

In Figure 5a the number of abrupt topic shifts has been displayed. The peak at the first intervention session is remarkable, as is the downward trend behind it. A possible explanation for the peak might be the nature of the encounter of the first intervention. Both partners are playing a computer game of soccer. Abrupt topic shifts could be inherent at playing a computer game, which might explain also that both interlocutors are responsible for the topic shifts. In the third encounter of the intervention, the client and the therapist are playing a game together about selling and buying cars. It is obvious that the client is able to keep his attention at the game and shows no need to change the topic suddenly.

Figure 5a. Percentage of abrupt topic shifts (F-coefficient).

In Figure 6a the percentage of turns is displayed that does not link up with the main content of their interlocutor's adjacent turn, although the contribution of the turn is linked to the previous turn. In this dyad most of these turns is due to the use of monologues, they link up with their own previous turn. Both interlocutors have reached some sort of balance in their conversation and both are using this type of turns between 15 and 20 percent of all turns.
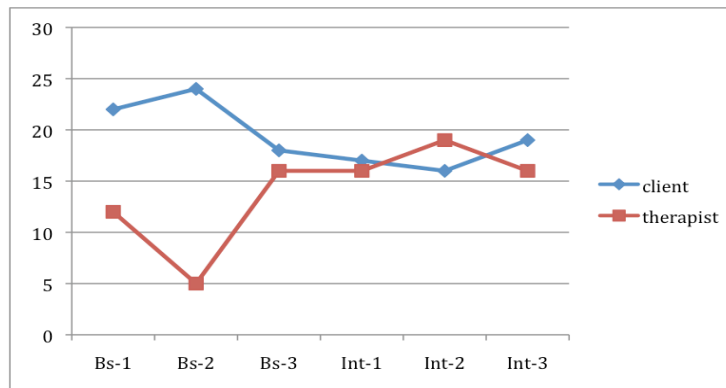
Figure 6a. Percentage of turns, that avoids to link up with the main content of the previous turn (O-coefficient).

In Table 2a a measure of dominance of the interlocutors is given in the IR-index. A higher number reflects the use of more dominant turns. The IR-index is a summary of all turns and the IR-difference gives an indication of which partner is most dominant in the interaction. In Figure 7a the IR-difference is displayed and it is notable that the communication between the partners has become more equal and the conversation more symmetrical during the intervention period. Both partners can communicate on equal basis; this is consistent with the description of the content of the sessions: playing together and having a pleasant time.

Table 2a: Measure of Dominance (IR-index) and Asymmetry (IR-difference)

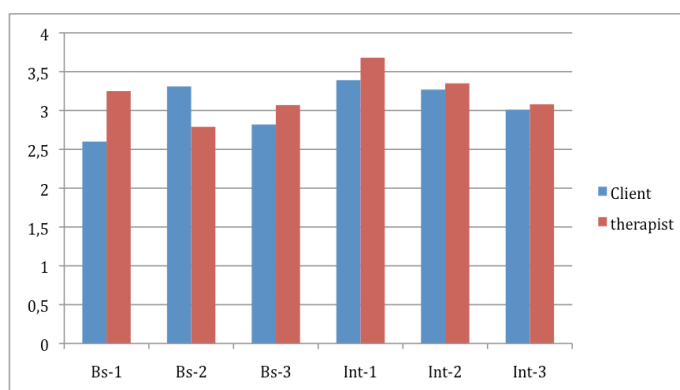|	IR-index client	IR-index therapist	IR-difference
Baseline 1	2,60	3,25	- 0,65
Baseline 2	3,31	2,79	0,52
Baseline 3	2,82	3,07	- 0,25
Int.1	3,39	3,68	- 0,29
Int.2	3,27	3,35	- 0,08
Int.3	3,01	3,08	- 0,07

Figure 7a: Asymmetry (IR-difference).

5. CRQA parameters: who is leading, who is following
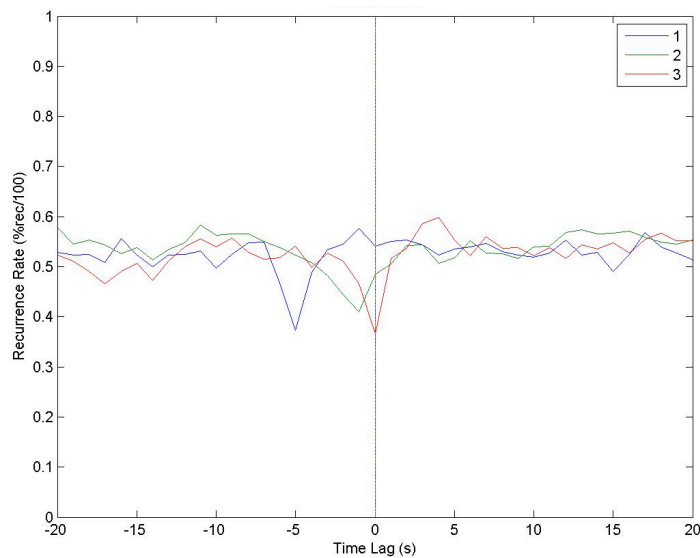

Figure 8a. Leading and following in the baseline sessions.
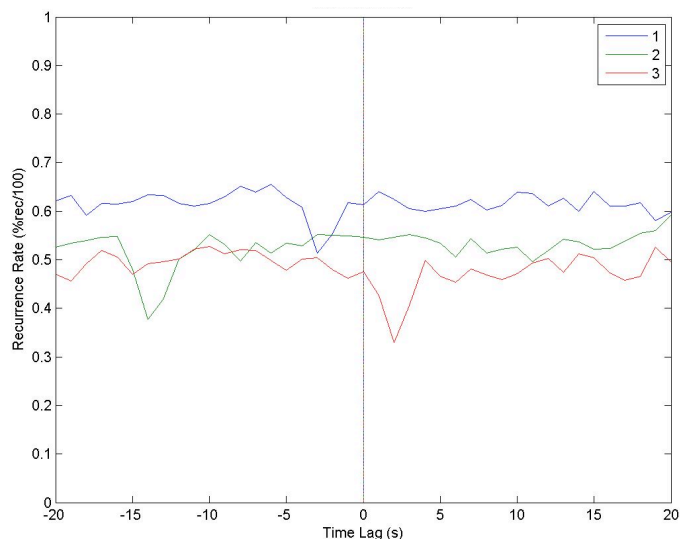

Figure 9a. Leading and following in the intervention sessions.

The Figures 8a and 9a present the results of the dyad with respect to synchrony or recurrence during the baseline and intervention period within a time interval of +/- 20 seconds around the Line of Synchrony. The left side of the panel presents the therapists' and the right side the clients' behavior.

The negative peaks at the left side of the panel of Figure 8a indicate that the therapist is leading the dyad in turn taking behavior, which can be starting a conversation or ending speaking at the same time. The dyad becomes less recurrent, which is necessary in a conversation: One speaks, one listens. Although the therapist is leading, the client is inclined to follow very quickly. During the first baseline session it takes him five seconds to follow, but in the second and third baseline sessions, the pattern is (almost) symmetrical, which means that none of the partners is dominant with respect of starting a conversation or ending 'talking at the same time'.

The negative peaks in Figure 9a, however, are more spread over both sides of the panel. In sessions one and two of the intervention the therapist is the leading partner, in session 3 it is the client. Although this result might seem like a drawback, because the dyad seems to experience less synchrony, it is also possible to regard this as a state of phase-shifting. First, it is important that patterns do change during the intervention period. The goal of the intervention is to elicit new behavior, so a change should occur. Second, the two goals of the intervention for the client were to experience synchrony, but also to become aware of the other person in the interaction. The negative peak during the third intervention session at the right side of the panel means that the client initiates turn taking behavior, namely starting a conversation or ending 'talking at the same time', more strongly than the therapist. It appears that the client is more aware of the presence of the therapist and likes to initiate turn taking behavior; the therapist follows within 3 seconds.

Table 3a: Percentage of Recurrence Rate

Film	Therapist leads	Client leads	Percentage of being silent at the same time	Percentage of speaking at the same time
B1	52,99892125	53,23624595	75,57677009	24,42322991
B2	53,11577145	45,81639204	81,70103093	18,29896907
B3	51,40509796	47,69117337	84,13284133	15,86715867
I1	61,53196877	58,2549061	88,40877915	11,59122085
I2	54,48626433	55,08544235	79,24528302	20,59748428
I3	40,83599234	48,48542863	72,19202899	27,80797101

Table 3a presents results with respect to starting recurrent behavior; this includes ending a conversation (or, vice versa, starting to speak together at the same time). Both client and therapist are leading in three sessions with respect to initiate recurrent behavior. No pattern might come up from this result.

Appendix Vignette B

Vignette 'client B – therapist 2' interaction

1. Description client-therapist dyad

    a. Dossier: Client B is a tiny 13-year-old girl with below average cognitive capacities (WISC-III 2006, TIQ 60, VIQ 69, PIQ 58). She is diagnosed with Reactive Attachment Disorder. According to a psychiatric doctor she has a severe delay in social, emotional and physical development. He estimated her emotional development between 12 - 24 months.

    b. Problem behavior: The client very much needs and seeks contact with her caretakers. Her strong focus or orientation towards others, has led to an insufficient development of her own personality. She hardly takes any initiatives and she has no opinion. In relation with others she shows socially adaptive behavior, she never argues but always wants that others think of her as nice and friendly. She is focused on pleasing other people and is insufficient aware of her own self. She has problems to recognize sensations of her body like emotions and feelings, or hunger and thirst.

    c. The therapist is a 22-year-old woman.

2. EBL intervention

– Goals:
    1. The client develops a sense of self-awareness.
    2. The client becomes more assertive towards others.

– Procedure:
    1. - The therapist wants the client to become aware of the distinction between her and others. The therapist gives her opinion about 'everything' she sees in the room and experiences during the play with the client. She asks the client about her opinion too.
      - The therapist creates situations in which the client has to choose something. The therapist takes care not to tell her what to do or choose, but waits until the client has made a decision.
    2. The therapist takes a wait-and-see attitude in contact with the client. She invites the client to take more initiative and to become more dominant in the interaction with the therapist.

3. Description filmed meetings: facts and impression

- Film 1: Baseline 07-10-2009

– The therapist and the client are sitting in opposite of each other behind a table in a private room. They have planned to play with Barbie dolls. The client holds up two Barbie's and asks the therapist which Barbie she wants to play with. The therapist answers that she herself may choose a Barbie, but the client replies that the therapist has to choose. Finally the therapist chooses a Barbie. The therapist takes the initiatives for the 'script' of their play. She makes the jokes, she makes up a story, she amuses the client and the client seems happy with it. Every time the client takes a break and does not know what to say next in the play, the therapist initiates a new action and the play continues. During this session, there is only one point that the

client makes a proposal herself. She proposes to play as if one of the two Barbie's is a male Barbie, the therapist agrees. In all other situations the therapist takes the initiatives. Both seem to enjoy the play together.

- **Film 2: Baseline 14-10-2009**
  – The client and the therapist are sitting next to each other behind a table. On the table is a basket filled with photo albums, diaries and other personal belongings of the client. They are discussing the photos, the diaries, and pictures of former friends of the client. The client shows the therapist her swimming certificate, she is very proud of it. The therapist poses a lot of questions about the past and present of the client using the photos and diaries and the client answers them, but the client also spontaneously tells about events in her life or reads out loud some parts of her diaries. The body of the client seems a bit tense during the session.

- **Film 3: Baseline 09-12-2009**
  – The client and the therapist are standing next to each other behind the kitchen dresser. They have planned to decorate cookies. The therapist has problems to open the bag of cookies, the client says: "Give it to me" and opens the bag using her teeth. During the session both seem to be more occupied with the decoration of their own cookies than with talking to each other. The therapist does not always respond on the actions of the client, although the client proposes some good ideas, such as mixing the colours of the icing or how to decorate the cookies. Both seem to have a nice time.

- **Film 4: Intervention 10-02-2010**
  – The client and the therapist are sitting next to each other on the ground. Before them there is a pile of birthday presents the client received from her family. They have planned to unwrap the paper of the presents one by one, while talking about the presents. The therapist gives her opinion about the presents, the colour of the paper and so forth. She asks the client her opinion and during the session the client gives her opinion more often about the presents. The client says that it makes her tense to talk this way and to give her opinion.

- **Film 5: Intervention 13-04-2010**
  – The client and the therapist are sitting next to each other behind a table. They have planned to complete a photo album of the client. The client leaves the table to get a pair of scissors, when she returns she reacts indignantly towards the therapist, because she had moved some photos and papers to a different place on the table. The client makes it very clear how she wants to reorganize the table and how she wants to complete her photo album.

- **Film 6: Intervention 12-05-2010**
  – The client and the therapist are sitting next to each other on the floor. In front of them there is a lot of material that can be used for the decoration of tiles. The therapist asks the client about her opinion: Does she prefer to decorate a tile of her own, or does she like to decorate one tile together? The client comes up with a very creative solution; they will start by decorating their own tile and then put the two tiles together to make one big tile. The therapist agrees. They both discuss the colours of the material they will use, the client is very clear and specific in what colours she prefers, what material

she likes best and she is not afraid to disagree with the therapist. She shows to have her own opinion.
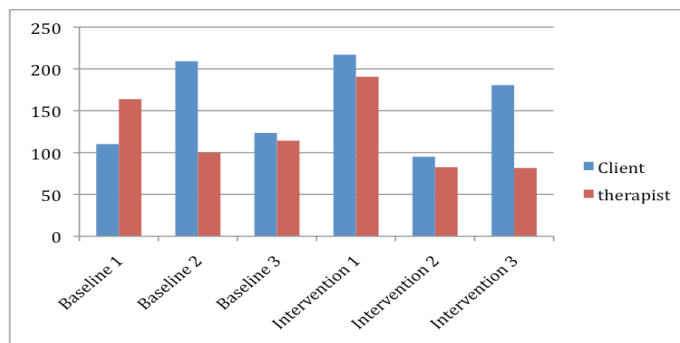
4. Interactional parameters of Linell

Figure 1b. The amount of speech produced in seconds as a measure of quantitative dominance (n = 480 for all films, except int. 2: n = 274).

Quantitative dominance, as a matter of 'who talks most of the time', is presented in Figure 1b. It shows that the client talks the most in all sessions, except for the first one. In film 2 and 6 she talks almost twice as much as the therapist. Although this might look as the same behavior, the original data of the film suggests otherwise. In baseline 2 the therapist, who is asking questions about the photos, provokes the talking behavior of the client; in intervention 3 the client likes to tell things herself.

The *interactional dominance* will be discussed by means of several categories that distinguish between the different dimensions of this dominance. In Table 1b the absolute numbers of each category is presented.

Table 1b. Distribution of Total Numbers of Categories of Interactional Dominance

	Total number of turns	The number of expanded responses (B)	The number of turns which lacks new initiatives (E)	The number of abrupt topic shifts (F)	The number of turns that avoids to link up with the main content of the previous turn (O)	The number of questions or strong initiatives (S)
Client						
Baseline 1	86	6	44	18	8	12
Baseline 2	96	7	28	37	14	1
Baseline 3	98	11	16	37	8	24
Therapist						
Baseline 1	95	2	19	34	14	34
Baseline 2	82	13	17	19	6	28
Baseline 3	72	15	14	23	6	11
Client						
Intervention 1	101	24	35	25	14	5

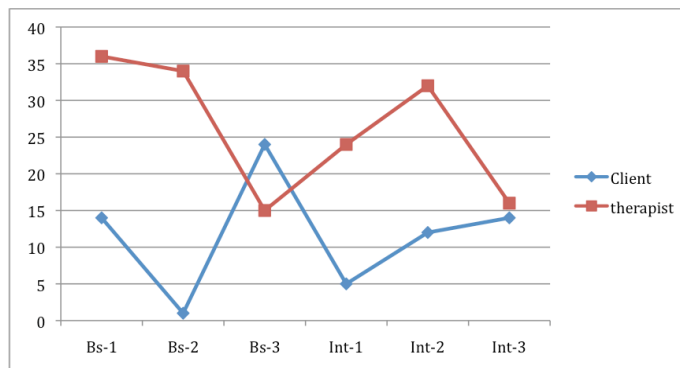|					
Intervention 2	52	21	11	6	7	6
Intervention 3	96	14	16	33	15	13
Therapist						
Intervention 1	96	26	27	18	5	23
Intervention 2	47	10	9	6	4	15
Intervention 3	62	9	14	20	7	10

Figure 2b. Percentage of turns, that consists of questions or strong initiatives (S-coefficient).

In Figure 2b the percentage of the turns is displayed that consists of strong initiatives or questions. The speaker, who uses this type of turns, explicitly solicits or demands a response from the other partner. The pattern shows great variability for both partners, with the therapist being the most dominant partner. A promising point is the result of the third intervention session, in which both partners are equally dominant in their use of strong initiatives.

Figure 3b. Percentage of expanded responses (B-coefficient).

In Figure 3b the percentage of expanded responses is displayed. The most striking feature of the Figure is the upward trend in the client's use from the onset of the intervention. During the baseline the client does not use this turn very much, on average 8 percent. In the intervention period the client uses this turn, on average, in 20 percent of all turns. Remarkable is the peak during the second intervention meeting. During this session the client is very determined to tell the therapist how she wants to complete her photo album. In the first and third session of the

intervention, the client and the therapist use this turn in more or less the same percentage of all turns.

In Figure 4b the percentage of the turns is displayed that lack any initiative to progress the conversation. With this turn the conversation comes to an end and one of the two interlocutors has to bring a new topic into the conversation to start it again. The figure shows that the line of the therapist is rather constant. The client however shows a downward trend right from the second meeting, which continues to the last session and appears to flatten down somewhat. Remarkable is the little peak during the first intervention session of both partners. Apparently, the nature of this session, opening different presents and discussing their opinions about the presents, might be the cause of this peak.

Figure 4b: Percentage of turns that lack initiative (E-category).

In Figure 5b the percentage of abrupt topic is displayed. The pattern in itself is whimsical; this might be due to the nature of the sessions. More interesting is that both interlocutors follow the same pattern up from the third session of the baseline. This means that both partners are equally shifting from topic, depending on the nature of their activity and not as a matter of dominance of one of the partners trying to control the interaction.
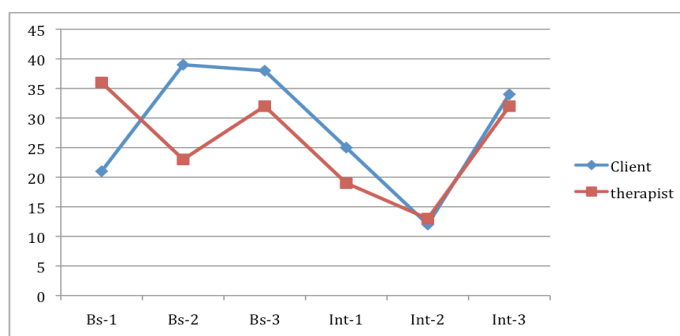

Figure 5b. Percentage of abrupt topic shifts (F-coefficient).

In Figure 6b the percentage of turns is displayed that avoids to link up with the main content of the previous turn, but is also used to indicates monologues. The original data indicates that the amount of monologues the client uses is much higher than of the therapist's.
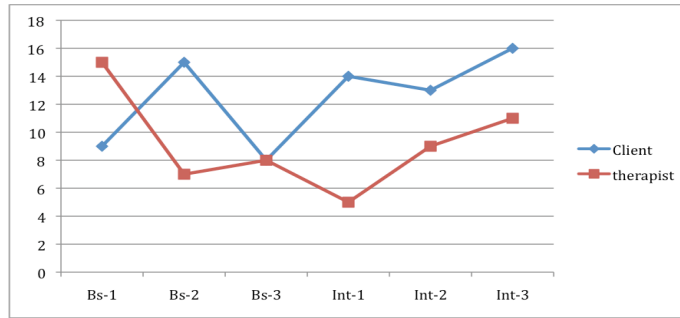
Figure 6b. Percentage of turns, that avoids to link up with the main content of the previous turn (O-coefficient).

In Table 2b and Figure 7b it is shown that the dominance of the client has been increased over time. This was one of the main goals of the intervention. The dominance of the therapist has decreased and the interaction of the dyad has become more symmetrical and even a bit more asymmetrical in favour of the client.

Table 2b: Measure of Dominance (IR-index) and Asymmetry (IR-difference)

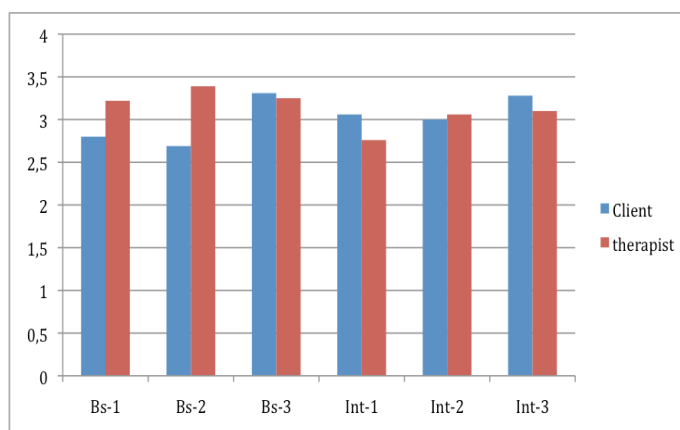|	IR-index client	IR-index therapist	IR-difference
Baseline 1	2,80	3,22	- 0,42
Baseline 2	2,69	3,39	- 0,70
Baseline 3	3,31	3,25	0,06
Int.1	3,06	2,76	0,30
Int.2	3	3,06	- 0,06
Int.3	3,28	3,10	0,18

Figure 7b: Asymmetry (IR-difference).

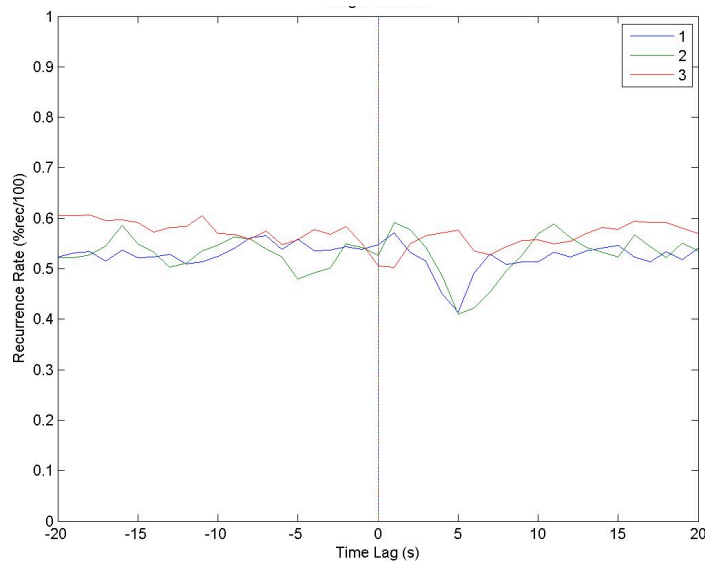## 5. CRQA parameters: who is leading, who is following

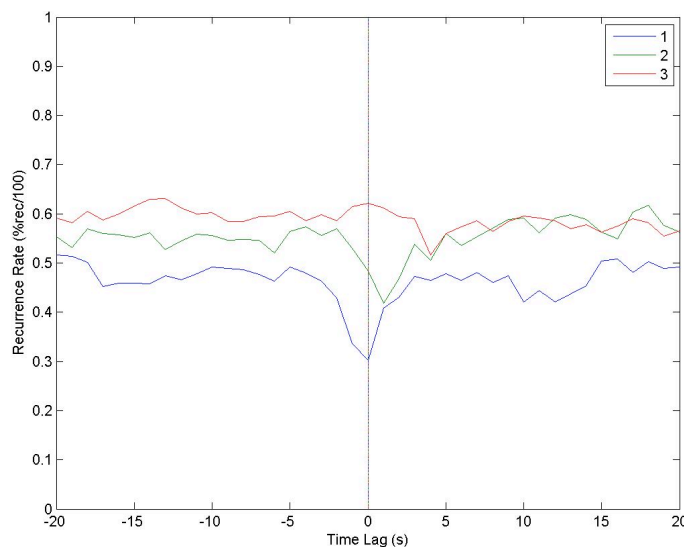Figure 8b. Leading and following during the baseline sessions.

Figure 9b. Leading and following during the intervention sessions.

The Figures 8b and 9b present the results of the dyad with respect to synchrony or recurrence during the baseline and intervention period within a time interval of +/- 20 seconds around the Line of Synchrony. The left side of the panel presents the therapists' and the right side the clients' behavior.

The negative peaks in Figure 8b at the right side of the panel show that the client is leading the dyad in turn taking behavior. She starts to speak when they are silent and is around 5 seconds earlier that the therapist. Vice versa is also possible, to keep silent when both are speaking at the same time, but as can be learned from Table 3b, the percentage of occurrence rate of being silent at the same time is much higher than speaking at the same. This suggests that turn taking behavior is more likely to be starting a conversation, than ending speaking at the same time.

The negative peaks in Figure 9b are more concentrated around the Line of Synchrony in the middle of the panel. This means that the dyad has become more

synchronized with respect to starting a conversation, especially in the first and two intervention sessions. It is too early to conclude that this synchrony will remain, but it clearly shows that the client has the possibility to adapt her timing to the pace of the therapist and to establish an equal relationship with respect to starting a conversation. Continuation of this synchrony will hopefully leads to reducing the clinging behavior of the client.

Table 3b: Percentage of Recurrence Rate

Film	Therapist leads	Client leads	Percentage of being silent at the same time	Percentage of speaking at the same time
B1	52,99163629	53,50203732	83,74306106	15,62252181
B2	54,8937084	52,5939446	82,10272873	17,89727127
B3	53,9754705	58,0038063	90,31456954	7,781456954
I1	42,25079702	41,59617428	73,44632768	26,55367232
I2	47,47467167	55,85741088	85,69254186	14,30745814
I3	56,48034006	58,19128587	86,8852459	13,1147541

Table 3b shows which partner is leading the dyad in recurrent behavior, which means being silent at the same time and thus ending a conversation. The results show that the client and therapist are both responsible for ending a conversation, although the client is slightly more leading.

Appendix: Vignette C

Vignette 'client C– therapist 3' interaction

1. Description client-therapist dyad
   a. Dossier: Client C is a 14-year-old Chinese boy with below average cognitive capacities (WISC-III 2007: TIQ 74, VIQ 67, PIQ 86). He is diagnosed with PDD-NOS in 2004.
   b. Problem behavior: Client C reacts mainly from his own perspective. He is unaware of the feelings and thoughts of other people, in general, or caused by his (unfriendly) behavior. He does not share his feelings or thoughts with others. He avoids making eye contact with others and has difficulties to start or maintain a conversation.
   c. The therapist is a 24-year-old woman.

2. EBL intervention
   – Goals:
      1. From an awareness of togetherness with the therapist, the client is invited to bring in a small variation in their interaction or play. He is capable to think about and to accept a variety of ways of playing a certain game.
      2. The client experiences 'turn-taking' in the interaction with the therapist.
      3. The client is able to exchange his thoughts and feelings with the therapist.
   – Procedure:
      1. The therapist introduces a game they can play together. She only gives one rule or purpose for the game, she then leaves room for the client to come up with a variety of ways to play the game while following the one rule.
      2. The therapist tells the client about her experiences in the past week. She invites him, without specifically asking, to do the same and to share his doings of the past days with her.
      3. During their weekly meeting, the therapist shares her thoughts and feelings about the activity they are doing: "I like this game". She will not ask questions to urge the client do the same, but she will take a break and silently invites the client to share his thoughts and feelings too.

3. Description filmed meetings: facts and impression
 - **Film 1: Baseline 13-10-2009**
   – The client and the therapist are playing soccer on a console. They are sitting next to each other. The client is concentrated on the game. He does not answer the therapist when she asks him questions about the functions of the controller, but instead grabs the controller and does the actions by himself. When the therapist asks for explanation again, he shortly and quickly gives the answers, but is unaware if the therapist has really understood his explanation. During the game, they hardly speak to each other. Whenever

the client talks, he does not make any eye contact with the therapist and he speaks with a flat voice, even so is his facial expression.

- **Film 2: Baseline 10-11-2009**
  – The client and the therapist are sitting at a table. The therapist has prepared a soccer quiz, because she expected that the client, who likes soccer, would enjoy the quiz. The client, however, is determined that he does not want to play the quiz. He gives in, a little bit, by reading the questions of the quiz, but concludes that the questions are boring and he refuses to play the game. The therapist is visibly disappointed and tries several times the client to play the game, but he refuses to be persuaded.

- **Film 3: Baseline 26-11-2009**
  – The client and the therapist are sitting at an angle of 90 degrees to each other. They are having an interview-like conversation. The therapist proposes all sorts of questions, which the client answers in a short way. The client avoids eye contact; he turns his head away while answering the questions. His facial expression is flat, as is his voice. A few times the client asks questions at the therapist himself.

- **Film 4: Intervention 11-02-2010**
  – The client and the therapist are sitting opposite of each other at the table. They are preparing a field, with paper and glue, to play air soccer together. The client glances briefly to the therapist a several times. The therapist appoints what she is doing, while working at the game. The client seems somewhat uncertain; he asks a several times if it is all right what he is doing and he asks her what she is doing, but in general he rarely speaks during this session.

- **Film 5: Intervention 25-02-2010**
  – The client and the therapist are working at their air soccer field. They are sitting opposite of each other at the table. The therapist asks the client about his doings during carnival. The client tells her how much he has drunk that night. She answers him by telling him a story about how much she has drunk once. The client seemed surprised. After a while he asks a question about the story he just heard. He seems to make eye contact every now and then and his facial expression appears to be less flat. The therapist proposes to have a drink together some day; the result is a dialogue between therapist and client, which ends with a long monologue of the client.

- **Film 6: Intervention 11-03-2010**
  – The client and the therapist are sitting at a table. The therapist has brought some magazines and photos. They have planned to copy some of the photos, by drawing. After a while, the client starts to tell a story about something he has experienced the past week. The therapist does not seem to give much attention to it, she continues with her drawing and the copying of the photo, while giving very short comments on his story. The client, however, continues his story even when the therapist interrupts his story and asks his opinion about her drawing.
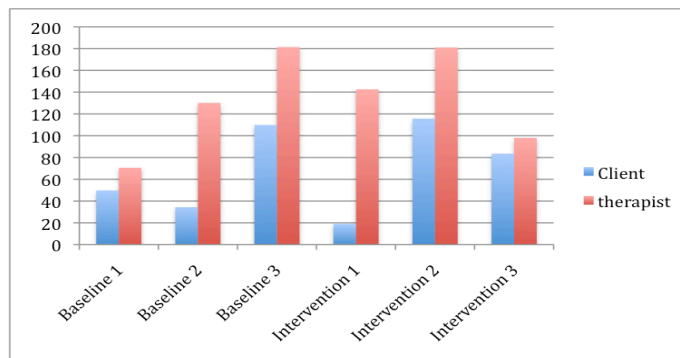
4. Interactional parameters of Linell

Figure 1c. The amount of speech produced in seconds as a measure of quantitative dominance (n = 480 for all films, except baseline 2: n = 404).

Quantitative dominance, as a matter of 'who talks most of the time', is presented in Figure 1. It shows that the therapist talks the most in all sessions. The most remarkable result is visible at intervention 1. The client hardly speaks, while the therapist talks a lot. As can be learned from the description of this film, the intervention of the therapist was to comment everything she was doing and to stop asking questions at the client. It is obvious that the client rarely speaks, if not directly asked. From the second intervention the amount of speech of the client increases. Although the amount of speech appears to be the same amount as during the third baseline session, the context is different. Based on the description of the film, the client is being asked to talk in the third baseline session, while he starts to talk by himself during intervention 2. The amount of speech produced by the client is no longer dependent from the therapist's questions, but he now can initiate and start a conversation.

The *interactional dominance* will be discussed by means of several categories that distinguish between the different dimensions of this dominance. In Table 1c the absolute numbers of each category is presented.

Table 1c. Distribution of Total Numbers of Categories of Interactional Dominance

	Total number of turns	The number of expanded responses (B-coeff.)	The number of turns which lacks new initiatives (E)	The number of abrupt topic shifts (F-coeff.)	The number of turns that avoids to link up with the main content of the previous turn (O-coeff.)	The number of questions or strong initiatives (S-coeff.)
Client						
Baseline 1	41	10	14	10	2	1

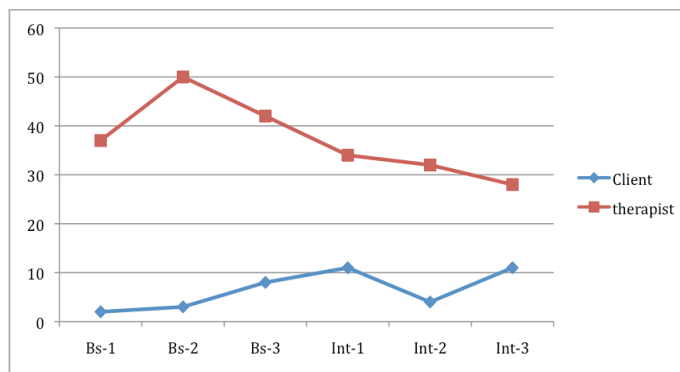|						
Baseline 2	30	14	12	2	2	1
Baseline 3	79	33	27	5	8	6
Therapist						
Baseline 1	51	4	7	19	4	19
Baseline 2	44	10	1	4	14	22
Baseline 3	104	18	25	12	14	44
Client						
Intervention 1	27	8	12	3	0	3
Intervention 2	73	24	27	1	12	3
Intervention 3	47	14	14	2	10	5
Therapist						
Intervention 1	73	13	2	11	33	25
Intervention 2	96	17	17	8	18	31
Intervention 3	53	23	4	5	12	15

Figure 2c. Percentage of turns, that consists of questions or strong initiatives (S-coefficient).

In Figure 2c the percentage of turns is presented that consists of strong initiatives. This type of turns explicitly solicits or demands a response from the interlocutor. The therapist is the most dominant at this point in this dyad. A downward trend from baseline 2 is visible for the therapist's pattern and at the same time, an upward trend for the client. At the session of intervention 3, the two lines come close together and the interlocutors become more equal to each other.
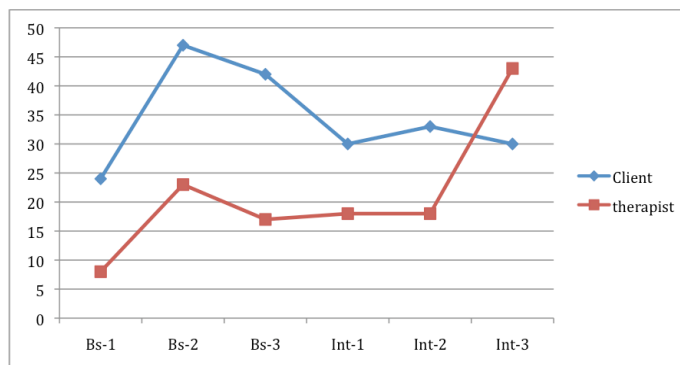

Figure 3c. Percentage of expanded responses (B-coefficient)

In Figure 3c the percentage of expanded responses is presented. A stable trend is visible for the client during the intervention, although lower than during the baseline sessions. The trend for the therapist is more or less stable, except for the session of intervention 3. During this session, the therapist is more inclined to respond without explicitly soliciting or demanding a response from her partner, than in all previous sessions.

In Figure 4c the results are presented of the percentage of turns that lack any initiative, but only contains a response. The pattern appears for both interlocutors very whimsical, although a slightly downward trend seems visible for the client from the start of the intervention sessions. Noticeable is the mirrored nature of the pattern, the less the therapist uses this turn, the more the client uses it and vice versa. It appears that whenever the therapist uses more turns that lack initiative, the client is able to lower his percentage of turns that lack initiative. The mirrored nature is not visible at session 3 of the intervention.
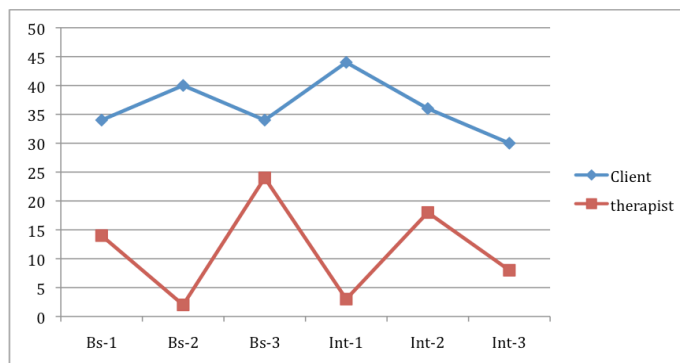

Figure 4c: Percentage of turns that lack initiative (E-category).

In Figure 5c the percentage of turns with an abrupt topic shift is presented. Although the pattern is ambiguous when the baseline sessions are compared with the intervention sessions, it is striking that both interlocutors follow exactly the same pattern. It appears that they have an equal relationship at this point. The therapist uses this type of turns more often than the client. The intervention does not seem to influence this mutual pattern of abrupt topic shifts.
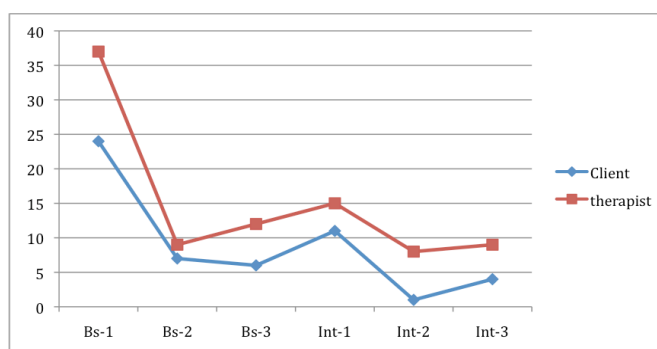

Figure 5c. Percentage of abrupt topic shifts (F-coefficient).

In Figure 6c the percentage of turns that avoids to link up with the main content of the previous turn is presented. This type of turns is also an indicator of the

percentage of monologues held by the interlocutors, which plays an important role in this dyad. Therefore, the peaks and valleys in this pattern are to be considered as the amount of monologues held by the interlocutors. At first a noticeable fact is the whimsical pattern of the therapist. As mentioned earlier, part of the intervention was to give comments on all her doings. Her attempt becomes very obvious at the first intervention session. The reaction of the client on this long monologue is also intriguing; he hardly speaks during the first intervention session. From that point the percentage of his monologues increases and becomes almost equal with the therapist. This figure complements the pattern of Figure 1c.
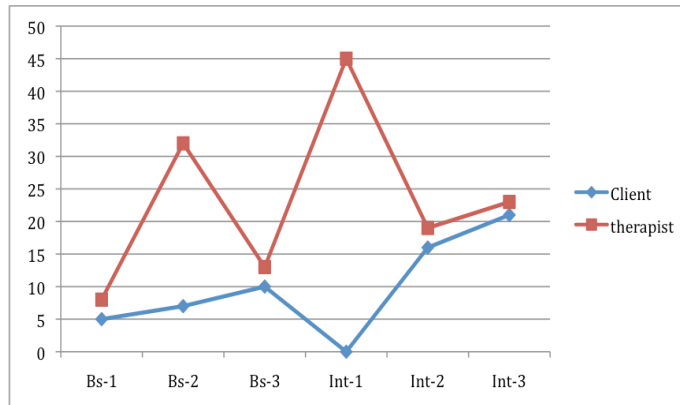

Figure 6c. Percentage of turns, that avoids to link up with the main content of the previous turn (O-coefficient).

In Figure 7c and Table 2c a measure of dominance is presented, IR-index and IR-difference. The results show that the intervention had no effect on this overall measure. The therapist is the most dominant partner of the dyad, during the baseline and the intervention sessions.

Table 2c: Measure of Dominance (IR-index) and Asymmetry (IR-difference)

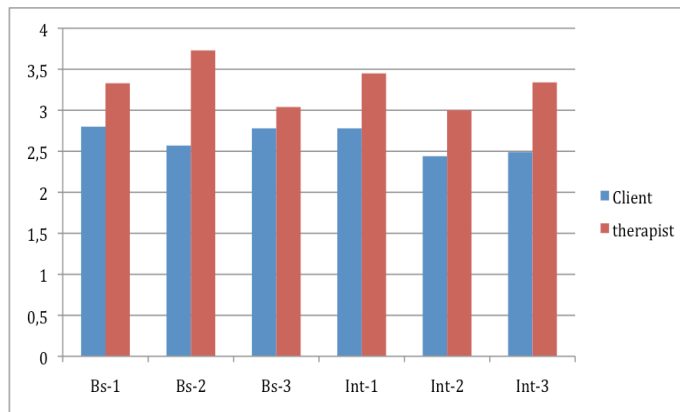|	IR-index client	IR-index therapist	IR-difference
Baseline 1	2,80	3,33	- 0,53
Baseline 2	2,57	3,73	- 1,16
Baseline 3	2,78	3,04	- 0,26
Int.1	2,78	3,45	- 0,67
Int.2	2,44	3	- 0,56
Int.3	2,49	3,34	- 0,85

Figure 7c: Asymmetry (IR-difference)

5. CRQA parameters: who is leading, who is following

The Figures 8c and 9c present the results of the dyad with respect to synchrony or recurrence during the baseline and intervention period within a time interval of +/- 20 seconds around the Line of Synchrony. The left side of the panel presents the therapists' and the right side the clients' behavior.

In Figure 8c the negative peak in the third session shows that the therapist is leading the dyad in turn taking behavior, namely she starts to speak when they are both silent and she is about 10 seconds quicker than the client. (Vice versa is also possible, she starts to keep silent when both are speaking at the same time, but that is very much unlikely in this dyad). This means that the interaction becomes less recurrent, which is necessary in a conversation: One speaks the other listens. The largest part of the sessions during the baseline consists of keeping silence. The therapist only speaks between 15 % and 31 % during the first two sessions, the client even less, around 10 % of the time. This explains the flat lines with a high recurrence rate of the first two sessions of the baseline, there is very little turn taking behavior (starting to speak) and even less behavior to follow it and there is lot of recurrent behavior: keeping silent.
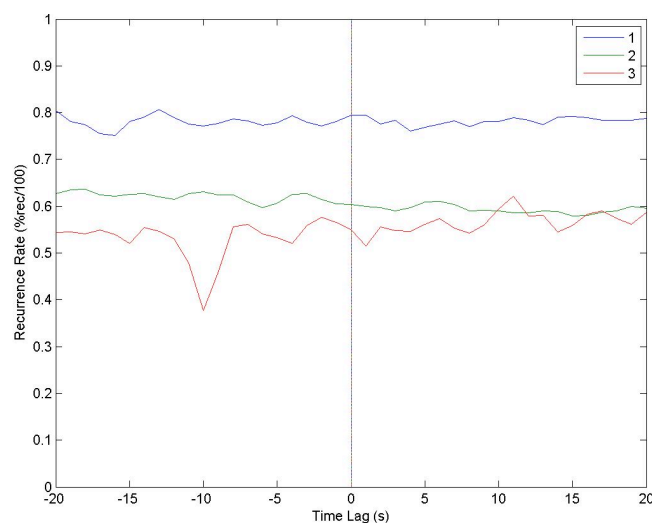

Figure 8c: leading and following baseline period

A few comments are worth making about Figure 9c. The interpretation of the flat line of the first intervention session follows the same logic as mentioned above. Speaking behavior of the client consists of only 4% of the time during this session, while speaking behavior of the therapist consists of almost 30%. This means that the recurrent behavior (keeping silent) is most visible and that there is hardly any non-recurrent behavior initiated by the client. The interactional pattern starts to change from the second session. Both interlocutors talk a lot more during session two (between 25% and 37%). The therapist leads the interaction and starts non-recurrent behavior, namely speaking, about 13 seconds quicker than the client. In the third session of the intervention, the therapist is still leading, but now she is only 3 seconds quicker than the client. There seems to be more equality in their interaction with respect to leading and following and starting a conversation.
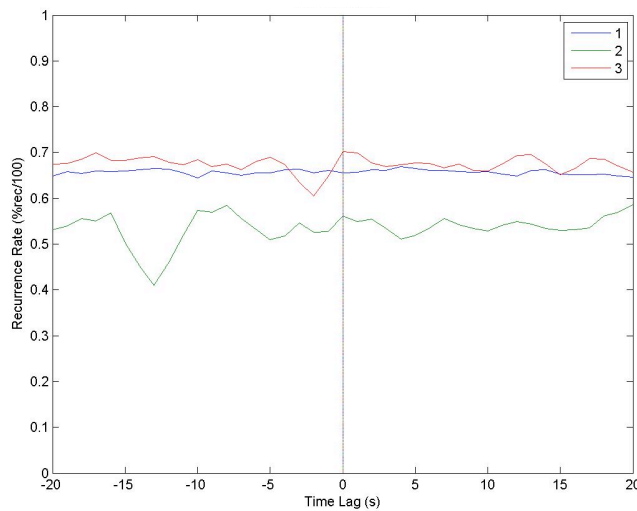

Figure 9c: leading and following intervention period

Table 3c presents results with respect to starting recurrent behavior; this includes ending a conversation (or, vice versa, starting to speak together at the same time, although this seems also very unlikely in this dyad). The difference between the client and the therapist is very small. During session B2 the client is most likely to lead in ending a conversation more often and during session I3 it is the therapist who leads in ending a conversation.

Table 3c: Percentage of Recurrence Rate

Film	Therapist leads	Client leads	Percentage of being silent at the same time	Percentage of speaking at the same time
B1	77,18684881	77,08265802	96,73202614	3,267973856
B2	61,31377214	63,66904573	96,35901778	3,640982218
B3	55,0271562	55,75494243	83,97185301	16,02814699

I1	68,02789279	68,73392896	98,07073955	1,92926045
I2	53,58094822	52,69608914	84,89959839	15,10040161
I3	68,09971572	64,41941832	94,18825016	5,811749842

Appendix: Tables and Figures

Table 1d. The IR Category System

Category	Content
A < >	Turn with clear properties of both response and initiative, the retroactive part (response aspect) being linked to the main content of the interlocutor adjacent turn and the proactive part (initiating aspect) involving a strong initiative.
B < ^	Same as A, except that the proactive part is a weak initiative. A strong initiative means that the speaker explicitly solicits or demands a response from the interlocutor. A weak initiative means that the speaker inserts something or submits a proposal for comment without explicitly soliciting or demanding (but often inviting) a response from the interlocutor
C >	Turn involving an initiative (strong) on a new and independent topic.
D ^	Turn involving an initiative (weak) on a new and independent topic.
E <	Turn linked to the interlocutor's adjacent turn and involving no initiating properties (minimal response).
F ..>	Non-locally linked initiative: turn with clear properties of both response and strong initiative, the retroactive part being linked to a specific nonadjacent turn further in the preceding dialogue.
G ..^	Non-locally linked initiative: turn with clear properties of both response and weak initiative, the retroactive part being linked to a specific nonadjacent turn further in the preceding dialogue.
H ..<	Turn linked to, and treated as satisfying the demands of a non-adjacent initiative and involving no initiating properties.
I =>	Turn linked to the speaker's own preceding turn. It is merely a repetition or reformulation of the speaker's preceding initiative. Mostly used when the interlocutor's response was inadequate. It contains a strong initiative.
J =^	As I, but contains a weak initiative.
K < = >	Turn with clear properties of both response and initiative, the retroactive part being linked to the speaker's won preceding turn and clearly ignoring an interjacent initiative (strong) by the interlocutor. Self linking initiatives.
L < = ^	As K, but with a weak initiative.
M : >	Turn with clear properties of both response and initiative (strong), the retroactive part being non-focally linked to the interlocutor's preceding turn.

N :^	As M, but with a weak initiative.
O -	Turn with a minimal and inadequate response. No initiatives and not relevant.
P ->	Turn linked to the interlocutor's preceding turn but deferring rather than in itself providing the adequate response to that turn.
Q (>	Turn lacking substantial content but involving an initiative (such as a proposal) to open a new topic of subgame.
R <)	Turn closing, or proposing to close, the current topic or subgame and involving no further new initiatives.
X (0)	Turnmiscarriage
S	Talking at the same time

6	5	4	3	2	1
		.. >	.. ^	.. <	
		: >	: ^	(>	
		< =>	< =^	<)	
		=>	= ^	- >	
>	^	< >	< ^	<	-

Turn independent and strongly proactive					Turn total dependent non proactive

Figure 1d. Turn categories and interactional strength, the IR-profile