

Effects of Asking Autistic Children Questions during Play

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Presented for MSc Applied Behaviour Analysis

October 2012

Bangor University

Acknowledgements

First of all, I would like to thank my family, for their love, support and understanding for the countless hours I have spent at the office carrying out the research and writing this thesis. I want to thank my husband, Peter, who believed in me and helped me brainstorm about the research design and the way the experiment should be carried out. His excellent proof reading skills helped me to formulate my thoughts and findings more precisely and concisely. Anouck, my daughter, who made sure all the videos had the beeps needed to score them, so the observers could work efficiently. My son Nathan, who got me started in ABA and continues to challenge me every day to be a better mother and educator. My daughter Ines, the youngest ABA-trainer I know, who played expertly with several of the participants while I reviewed the sessions with the parents.

I would like to thank my university supervisor, Dr. Maggie Hoerger, who helped me transform an idea into a research project and helped me stay focussed during my research and thesis writing.

I would also like to say thank to my colleagues, Laura Schouten and Liza Timmermans, who scored the videos for inter-observer agreement and filmed most of the experimental sessions. Also, they supported me and stood by me, even when I came up with new ideas and changed things at the last minute. They always made sure the experimental room was ready and stored the videos on the right disks.

Special thanks to Robbie van Hoof for writing the computer program for the randomized intervals on very short notice.

I am thankful for the friends who reviewed my thesis, Frida Koopmans, Lisanne de Barse. Even in their busy lives, they made time to comment on my drafts.

Special thanks to Sara van der Paelt, of Gent University who commented on my last draft and who recommended Annelien Mees to me when I was desperately in need of

someone to score the videos. Annelien did a great job in coding endless hours of videos and always responded very quickly to my requests for yet another kind of information from all our data.

I want to express my gratitude to Frans van Haaren, PhD, BCBA-D, director of the ABA Academy in St. Petersburg, Florida, who as my professional supervisor was kind enough to supply me with ruthless feedback at every stage of this project. His endless support and encouragement over the past ten years have inspired me to pursue a Masters' degree in ABA.

Finally, I want to give the most special thanks to the children I have had the chance to work with over the years, and of course their parents. You are all my biggest inspiration for being the best student and the best professional I can be.

Declaration

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed.....

Date.....

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used, the extent and nature of the correction is clearly marked in a footnote(s).

Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signed

Date.....

STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for photocopying and for interlibrary loan, and for the title and summary to be made available to outside organisations.

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Word count: 6,538

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Abstract

We investigated the possible adverse effects of asking questions during play on the social interaction, toy play, and spontaneous speech of children with autism. Five children (5-10 year old) participated. In an alternating treatment design, we compared three free-play conditions: (1) Questions: the experimenter asked the participant a question on a 20-s variable-time schedule. (2) Comments: the experimenter stated a comment at the same rate. (3) Neutral: the experimenter asked no questions and made no comments. Each condition lasted 10 minutes and was counterbalanced over three 1-hour sessions. All sessions were conducted by the experimenter in the same playroom. We recorded following responses (a) toy play: manipulating, carrying or holding toys appropriately, (b) social interaction: being oriented towards the experimenter and looking at, smiling to, speaking to the experimenter, (c) stereotypy: repetitive movements with body or an object, (d) palilalia: dysfunctional delayed repetition of words or sentences, (e) negative social interaction and, (f) utterances: functional words or sentences. Four out of five participants were less likely to interact with the experimenter and emitted fewer spontaneous utterances in the Questions condition compared to the Neutral condition. In addition, the participants engaged more in undesired behaviours like stereotypy in the Questions condition. A possible function of the child's stereotypy is to escape from demands. This suggests that questions at this high rate may be aversive for some children, who then avoid interacting with the experimenter.

Keywords: embedded prompting, naturalistic teaching, asking questions, incidental teaching, autism, children, pivotal response training.

Effects of asking autistic children questions during play

Young children learn many social and language skills during play. (Koegel, Koegel & Dunlap, 1996; Moyles, 1989). Autistic children often lack appropriate play skills. This reduces their opportunities to learn language skills during play. The environment in which children learn language is strongly influenced by the parents, who have many opportunities to teach their children communication skills, pretend play and play with toys (Kaiser, Hancock & Nietfeld, 2000). Using children's motivation for toys to teach them language skills is an example of naturalistic language teaching (Peterson, 2004).

Various naturalistic language teaching procedures have been described during the last 20 years: Pivotal Response Training (Koegel et al., 1996), Incidental Teaching (Hart & Risley, 1974, 1975), Enhanced Milieu Teaching (Kaiser et al., 2000), Embedded Teaching (Daugherty, Grisham-Brown & Hemmeter, 2001; Horn, Lieber, Li, Sandall & Schwartz, 2000). They have been shown to be effective in teaching children language skills (Peterson, 2004). For instance with Incidental Teaching, children in a school setting have been taught to name objects, then name characteristics of objects, then make compound sentences in a school setting (Hart & Risley, 1974, 1975). Parents are often very enthusiastic about the training itself and the progress their children make (Kaiser et al., 2000).

In naturalistic language teaching procedures, adults often pose questions to get a desired verbal response from a participant. For instance, when the participant shows that he wants a ball on a shelf, the adult asks the participant: "What is that called?" When the participant says "ball", the adult will give him the ball (Hart & Risley, 1974, 1975). Questions which are asked to teach a participant language skills or to prompt a verbal response from the participant during naturally occurring activities, are also called "embedded prompts" (Horn et al., 2000).

Several studies show that the children can make large gains in the acquisition of language during these naturalistic language-teaching procedures (Peterson, 2004). However, some studies indicate that embedded prompting may have aversive effects on children's play behaviours (Hart & Risley 1974, 1975; Heal, Hanley & Layer, 2009; Heal & Hanley, 2011). The data recorded by Hart and Risley (1974, 1975) show that the children request toys less frequently towards the end of the incidental teaching study. Heal et al. (2009) and Heal & Hanley (2011) found that children touched toys less when embedded prompts were used.

Teaching language to children with naturalistic teaching procedures

According to Hart and Risley (2003), the language development of a participant is very much influenced by the number of words he hears during the first 3 years of his life. Three-year-old children in families with high social economic status (who had heard an average of 2,153 words per hour) had far better outcomes in education than children in low social economic status families (616 words per hour). The authors do not mention what exactly the parents said or how they responded to their children.

Various ways in which adults can enhance the language development of children during (free) play are described in the research on naturalistic language procedures, for instance in the studies on Incidental Teaching in a school setting by Hart and Risley (1975). Incidental Teaching occurs when a participant initiates interaction by showing interest in an object or requires assistance from an adult and the adult then uses this opportunity to teach the participant a skill. In the Hart and Risley studies (1974, 1975) the participant wants to obtain a toy on a shelf. When the adult sees this, he asks the participant: "What do you want?", "What are these?" or "What is that called?" The participant then says the name of the toy, upon which the adult gives it to him. After the participant has mastered this skill, the adult asks other questions in order to teach the participant to name adjective-noun combinations. The

adult might ask “What kind?” or “What do you want to do with that?” After the participant has acquired this skill, he is asked: “Why?” and “What for?” so that he has to make a compound sentence before he receives the toy that he wants. All children learned to make compound sentences during these studies.

Asking questions during play is also a common practice in Pivotal Response Training (PRT) (Koegel et al., 1996). For instance, to teach children with autism symbolic and socio-dramatic play skills, an adult might ask a child: “What can you do with this car?” or “What can we do in this house?” To increase children's social competence, questions can be asked to encourage the children and to extend the conversation. This procedure is also taught to the children's peers. For instance, when a participant has requested to play with Play-Doh, a peer is taught to say: “I like making a snake! What are you going to make?” The idea is that the participant with autism is more willing to talk when peers or adults ask him questions about the toys he is playing with. Several different single-subject studies have shown that PRT can improve social communication deficits in autism, such as expressive communication, self-initiations such as question asking and commenting and play skills (Rogers & Vismara, 2008).

Possible adverse effects from asking questions during play

Hart and Risley (1974, 1975) argue that the children did not avoid the incidental teaching situation compared to the play situation without incidental teaching. They infer this from the fact that the children preferred requesting the toys used for incidental teaching rather than play with the freely available materials. A weakness of both studies is that the incidental teaching toys were different and possibly more interesting than the free toys. In addition, because the children could always play with the free toys, they may have been more interested in the incidental teaching toys because of their state of deprivation with respect to these toys.

Furthermore, in both their studies, a downward trend can be seen in the percentage of requests from the children to their teachers. This may be caused by the fact that the children had to answer increasingly more questions before they got access to the toys. This may have made the incidental teaching procedure increasingly aversive for them. At first, little response effort was necessary to get the item, but later on much more had to be done in order to get the toys.

In addition, it is possible that for some children, this response requirement became eventually too difficult for them and therefore may have contributed to the decrease in requests.

Heal, Hanley and Layer (2009) compared three strategies to teach six children colour-name and object-name relations in a multi-element design. Each strategy included a free play situation but differed in the amount of teacher directedness. The purpose of the study was to see which teaching strategy was preferred by the children and most effective in teaching the children the target skills. The children were taught to name animals or colours in Spanish. In Strategy 1, the teacher first showed and labelled every target item (toy) once. She then played with the participant and praised him for every time he labelled the animal or colour correctly. If the participant labelled the animal or colour incorrectly the teacher did not correct him. In Strategy 2, the teacher immediately started the participant-led play session and used embedded prompts to teach the participant the target name relations. When the participant showed interest in a target item, the teacher asked, "What colour is that car?" without interrupting his play. The teacher then corrected the participant if his answer was incorrect and provided praise if his response was correct. In Strategy 3, the teacher first started to teach the participant the target relations during a brief direct instruction session. She held up a colour or animal card and asked: "What colour [animal] is this?" If the participant was correct, he received praise and tokens; if he was wrong, the teacher corrected the participant. After this brief session, she played with the participant and used embedded

prompts as in Strategy 2. Each strategy was associated with a coloured card, which was presented to the children before they entered the playroom. After the children had experienced all three teaching strategies during forced-choice blocks, the teacher conducted free-choice blocks where the children could choose the teaching strategy. The results showed that the children preferred a strategy in which they received direct instructions (Strategy 3) over a strategy where embedded prompts had been used (Strategy 2).

However, the children may have preferred Strategy 3 for other reasons; the children additionally received conditioned reinforcers (tokens) for correct responses; they had more learning opportunities and as a result were more successful in naming the target relations. The children made proportionally more errors in Strategy 2 and had a lower rate of positive reinforcement. All these conditions may have led them to avoid Strategy 2 (Carbone, Morgenstern, Zecchin-Tirri & Kolberg, 2007).

The most interesting finding from this study is that the authors note that one participant touched the toys used for embedded teaching less across time in Strategy 2. The authors hypothesize that the delivery of questions while the children were playing might have interrupted their play.

In a follow-up study, Heal and Hanley (2011) investigated the effects of embedded prompts on the play behaviours of one child. Contrary to the first study, embedded prompts were only used in Strategy 2, in which they asked the child to name the target relation when she touched a target toy. Strategy 1 was the same as in their previous study; the experimenter named the target relation once followed by a play session and reinforced correct responses. In Strategy 3, direct instruction was followed by a child-led play session as in Strategy 1. Only during Strategy 2 sessions, the percentage of intervals during which the child played with the toys quickly decreased to zero. Their conclusion was that the embedded prompts had functioned as a punisher for the child's play. The child may have stopped touching the toys

because her play was interrupted by the experimenter's questions even though the experimenter did not physically interrupt the child's play.

In both studies (Heal et al., 2009; Heal & Hanley, 2011), the children were taught to name a colour or an animal in Spanish in response to the question: "What colour [animal] is that?" The participant's verbal behaviour of naming a colour or an animal is categorized by Skinner (1957) as a tact. Tacts are reinforced by non-specific reinforcement. In other studies, the children were taught to name the object they wanted. When the children labelled the item correctly, it was given to them (Hart & Risley, 1974, 1975). This verbal behaviour is categorized as a mand, because it is reinforced by the receipt of the specified object. Teaching tacts instead of mands may have contributed to the aversive nature of the embedded prompts. The authors advise that because embedded prompting strategies are widely used, further research is important, to investigate when and how embedded prompts are best used during play.

Furthermore, answering questions about things that are not present may be very difficult for children with autism (Sundberg & Michael, 2001). For instance, when an adult asks a participant: "Can you name some animals?" and he answers, "Cat, dog", this type of verbal behaviour is called an intraverbal (Skinner, 1957). Sundberg and Michael (2001) argue that even though children with autism may have hundreds of mands and tacts for objects, they may be unable to talk or to answer questions about these objects when they cannot see them.

In summary, research indicates that parents play an important role in their participant's language development (Hart & Risley, 2003; Kaiser et al., 2000). With naturalistic language teaching procedures, parents can teach their children language skills during play. An important element of these naturalistic language-teaching procedures is the use of embedded prompts. According to the reviewed literature, these techniques can be taught to parents and

greatly benefit their children's language and communication skills (Kaiser et al., 2000; Koegel et al., 1996; Peterson, 2004).

However, children with autism may have experienced the play situation with their parents as an aversive set of conditions. Their parents may have asked them too many and too difficult questions. If their parents applied naturalistic teaching techniques, they may have removed toys or obstructed their children to get a response (Ingersoll, 2008; Kaiser et al., 2000). Consequently, the play situation with their parents may have become an aversive set of conditions from which they want to escape (Carbone et al., 2007). Unfortunately, only one study investigated the possible (adverse) effects of asking children questions during play.

In view of the above, we investigated the effects of questions on children's play and social behaviours. Three free-play conditions were compared in an alternating treatment design (1) Questions: the experimenter asked the participant a question on a 20-sec variable-time schedule. (2) Comments: the experimenter stated a comment at the same rate. (3) Neutral: the experimenter did not ask any questions or make any comments.

Method

Participants

Participants were five boys with autism who had been referred by their parents. They were selected based on their availability. All children had language delays and had deficits in social play skills. Table 1 shows more specific information about the participants.

Table 1

Characteristics of participants and developmental age of Language, Independent Play (Ind. Play), Social Play skills

Name	Age (years)	Age (months)	Gender	Mand (months)	Tact (months)	Ind. Play (months)	Social Play (months)
Howard	7;11	95	Male	18-30	30-48	30-48	18-30
Will	8;2	98	Male	0-18	18-30	18-30	0-18
Leonard	9;3	111	Male	30-48	30-48	30-48	18-30
Barry	5;11	71	Male	30-48	30-48	30-48	18- 30
Sheldon	7;7	91	Male	30-48	30-48	30-48	18-30

Note. The measures are from the Verbal Behaviour Milestones Assessment and Placement Program (VB-MAPP) (Sundberg, 2008).

Experimental Design

To investigate the effects of asking questions during play we used an alternating treatment design (Barlow & Hayes, 1979). Three free-play conditions were compared: Questions, Comments, and Neutral (no questions or comments). All sessions were conducted by the experimenter in the same room and with the same toys. In a one-week period, each participant had three play sessions. Each session was divided into six 10-minute periods. To minimize sequence effects, the conditions were counterbalanced (see appendix I, table 1 and 2).

Procedure

Experimental Setting

All sessions were conducted in a playroom with four child-sized table and chairs, which stood against the walls. The room had a large cupboard in which many toys were

displayed. Two other large cupboards contained in total 16 drawers with toys like Lego, small plastic animals, cars, and puzzles. On the child-sized tables, many toys were displayed like a Fisher-Price farmhouse with animals and Play-doh. The same toys were available in all sessions (see appendix II for a list of all toys).

Free-play conditions

Before starting the free-play session, the participant had not played with any toys (including computer games) and had not watched any videos for at least two hours. The parents were received in the playroom and the experimenter told the participant that she was going to play with him for one hour. She then opened all drawers briefly to show him which toys were available. She told the participant that person X was filming the play session and that his parents would leave and return after one hour. Depending on the schedule, the experimenter started the free-play session with condition Q, C, or N.

In condition Q (questions), the experimenter asked the participant a question on a Variable Time (VT) 20-seconds schedule. Questions varied depending on the situation. When the participant was not engaging in any play or when the experimenters did not know what the participant wanted to play with, she asked: "What do you want to play with?", "Do you want to play with ...?" or "Shall we play with the...?" When the participant touched a toy or showed interest in a toy by reaching for it, the experimenter asked him questions like: "What is that?", "What colour is that?" and when he was performing an action or engaged in an activity without toys she asked him questions like: "What are you doing?" If he was making a doll perform an action she asked him questions like: "What is that?" or "What is he/she doing?" *In condition C (comments)*, the experimenter commented on her toy or on what she was doing on a VT 20-seconds schedule. For instance, when she had a car she said: "I am driving", "I have a red car", "My doll has a diaper!", "that car is going fast!" or "I cut the vegetables".

In condition N (neutral: no questions or comments), the experimenter did not ask the participant any questions and did not make any comments. For instance, if the participant put a little Figure in a car and drove towards a house, the experimenter followed him with a car of her own and/or she made car noises.

In all three conditions, the experimenter followed the participant's lead. When the participant engaged in play and/or interacted with the experimenter, she smiled, sang, or responded favourably in another way to the participant. For instance, when the participant said "car", she gave him the car. When the participant asked her a question, she answered him. When the participant looked at her, she smiled at him. When the participant reached for a toy, she gave him the toy, without naming the object. When the participant played with wooden fruits and vegetables, she took some wooden knives to make it possible for him to cut the fruits. In addition, if the participant or experimenter was driving a car or playing with an animal, the experimenter made appropriate sounds like "Vroom, vroom" or "Mooh"(for a cow). If the participant started to sing, the experimenter would sing with him and make the corresponding gestures.

If the participant engaged in inappropriate behaviours like stereotypy, the experimenter continued with what she was doing as if nothing happened. At the end of the session, the experimenter told the participant that the play session was finished and that it was time to go home with his parents.

Response definitions

Responses were divided into six categories (a) toy play, (b) social interaction (divided into prompted and spontaneous social interaction), (c) stereotypy, (d) palilalia, (e) negative social interaction, and (f) utterances (divided into prompted and spontaneous speech). *Toy play* was defined as manipulating, carrying or holding toys as the manufacturer intended. This included non-symbolic as well as symbolic play. *Social interaction* was defined as being

oriented towards the experimenter and looking at, smiling to, speaking to or gently touching the experimenter. When a participant (Howard) told the experimenter to go away or told the experimenter he wanted to leave the room, this was not scored as social interaction, but scored separately as problem behaviour (negative social interaction). If a participant looked at or spoke to the experimenter because of the experimenter's question or comment, this was scored as prompted social interaction. *Stereotypy* was defined as repetitive movements with the body or with an object. *Palilalia* was defined as delayed repetition of words or sentences. *Negative social interaction* was defined as verbalizations or other behaviours that demonstrated the child wanted to get out of the room or make the therapist go away. *Utterances* were defined as every functional word or sentence the participant emitted. Some children, like Will and Sheldon merely used one-word sentences, whereas the other participants spoke in full sentences. A sentence (whether it consisted of one or four words and whether it was finished or not) was scored as one utterance. Prompted speech was scored when the participant responded to the experimenter's questions and comments. See appendix III for detailed response definitions.

Measurement

All sessions were filmed with a digital video camera. Informed consent was obtained from parents. A copy of informed consent can be found in appendix IV. Responses in toy play and social interaction were scored conducting 10-sec Momentary Time Sampling (MTS) recording and were reported as percentages. Stereotypy and palilalia were scored conducting 10-seconds Partial Interval (PI) recording and were reported as percentages. We chose MTS recording for the desired behaviours because this is a very reliable measurement of frequent behaviours (Devine, Rapp, Testa, Henrickson & Schnerch, 2011). PI recording was used for undesired behaviours, because we expected these would occur at a low rate and we did not want to miss any undesired behaviour.

Inter-observer agreement

A second observer independently recorded responses during 30% of each one-hour session. For each hour, two randomly allocated sessions were scored and of the total three hours, for each participant, two sessions of the same condition were scored for inter-observer agreement (IOA). For example, session 1.1N, 1.3Q, 2.1C, 2.2Q, 3.2N, and 3.6C were scored. For the data obtained using Momentary Time Sampling recording (toy play and social interaction), interval-by-interval inter-observer agreement (IOA) was calculated by dividing the number of intervals agreed by the total number of intervals and then reported as a percentage. For toy play, agreement was 94% (range 85% to 100%) across all participants. For social interaction, agreement was 91% (range 85% to 98%) across all participants. For the data obtained using PI recording (stereotypy and palilalia) scored-interval IOA was calculated by using only those intervals in which either observer recorded the occurrence of the behaviour and then dividing the agreements by disagreements and then reported as a percentage. For stereotypy, agreement was 99.6% (range 93% to 100%) across all participants. For palilalia, agreement was 93% (range 80% to 100%) across all participants. The inter-observer agreement for the participant's utterances was calculated for 30% of the data by dividing the smaller of the counts by the larger count per measurement period (10-min) and then reported as a percentage. Agreement was 93% (session range: 82% to 100%) across all participants.

Results

Percentages of interval occurrence of spontaneous social interaction, toy play, stereotypy, and palilalia are presented for each participant in Figures 1 through 5. Figures 1 through 4 show that for participants (Will, Leonard, Barry, and Howard) spontaneous social interaction and spontaneous utterances were consistently higher in the Neutral condition than in the Questions condition. The average percentage of spontaneous social interaction in the

Neutral condition for these four participants was 32% (range 21-41%) compared to 24.5% (range 14-31%) in the Questions condition. The average spontaneous utterances these four participants emitted in the Neutral condition was 5.8 (range 1.3-9.5) per minute which decreased until 4.65 per minute (range 0.7-7.7) in the Questions condition.

Furthermore, Figure 1 and 4 demonstrate that two of these four participants, Will and Howard, engaged in stereotypy most often in the Questions condition. Will engaged in stereotypy 15% of the time in the Questions condition, compared to 11.94% and 13% in the Comments and the Neutral condition respectively. Howard engaged in stereotypy 1.38% of the time in the Questions condition, compared to 0% and 0.27% in the Comments and Neutral condition respectively. There is no evident effect of the asking of questions on the toy play of the participants. However, Figure 1 shows a very variable trend for toy play in the Questions condition for Will, with the lowest percentage (28%) of toy play in this condition. Figure 2 illustrates that Leonard's toy play on the first day is stable in the Comments and Questions condition but descending in the Questions condition. Finally, Figure 3 demonstrates that Barry played the least with toys in the Questions condition.

Figure 1, 3 and 4 demonstrate differences in responding between the Questions and the Comments condition for three of these four participants. Figure 1 shows that in the Comments condition, Will engaged in more spontaneous social interaction and emitted more spontaneous utterances than in the Questions condition. Also, an ascending trend can be seen in his toy play in the Comments condition. Furthermore, Figure 1 shows a descending trend in stereotypy until it reaches 0 in the Comments condition. Figure 3 illustrates that Barry emitted more utterances and played more with toys in the Comments condition compared to the Questions condition. Finally, Howard, the only participant who engaged in negative social interaction, engaged most in these behaviours during the Comment condition.

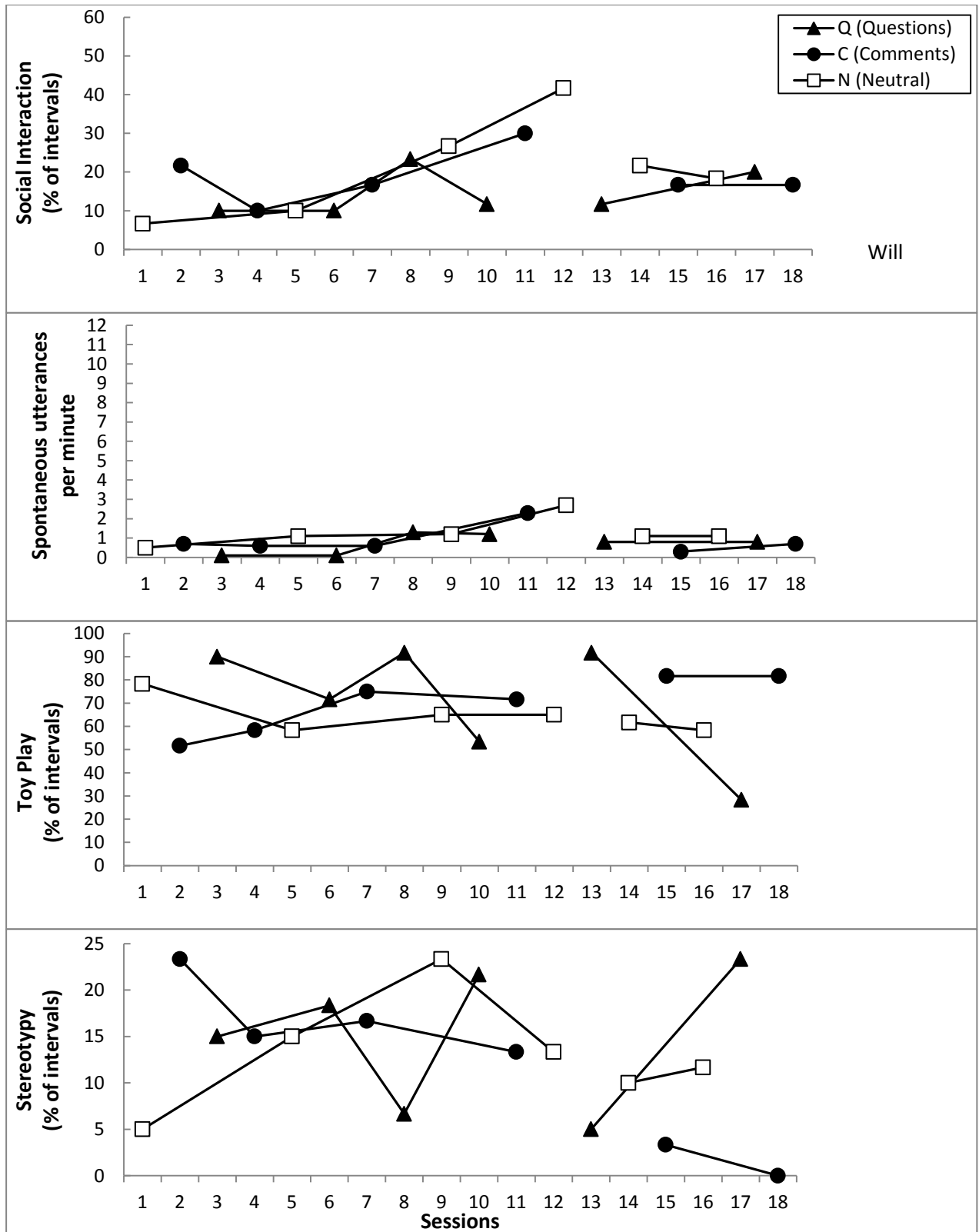


Figure 1. Percentages of social interaction, spontaneous utterances per minute, percentages of toy play and stereotypy for Will

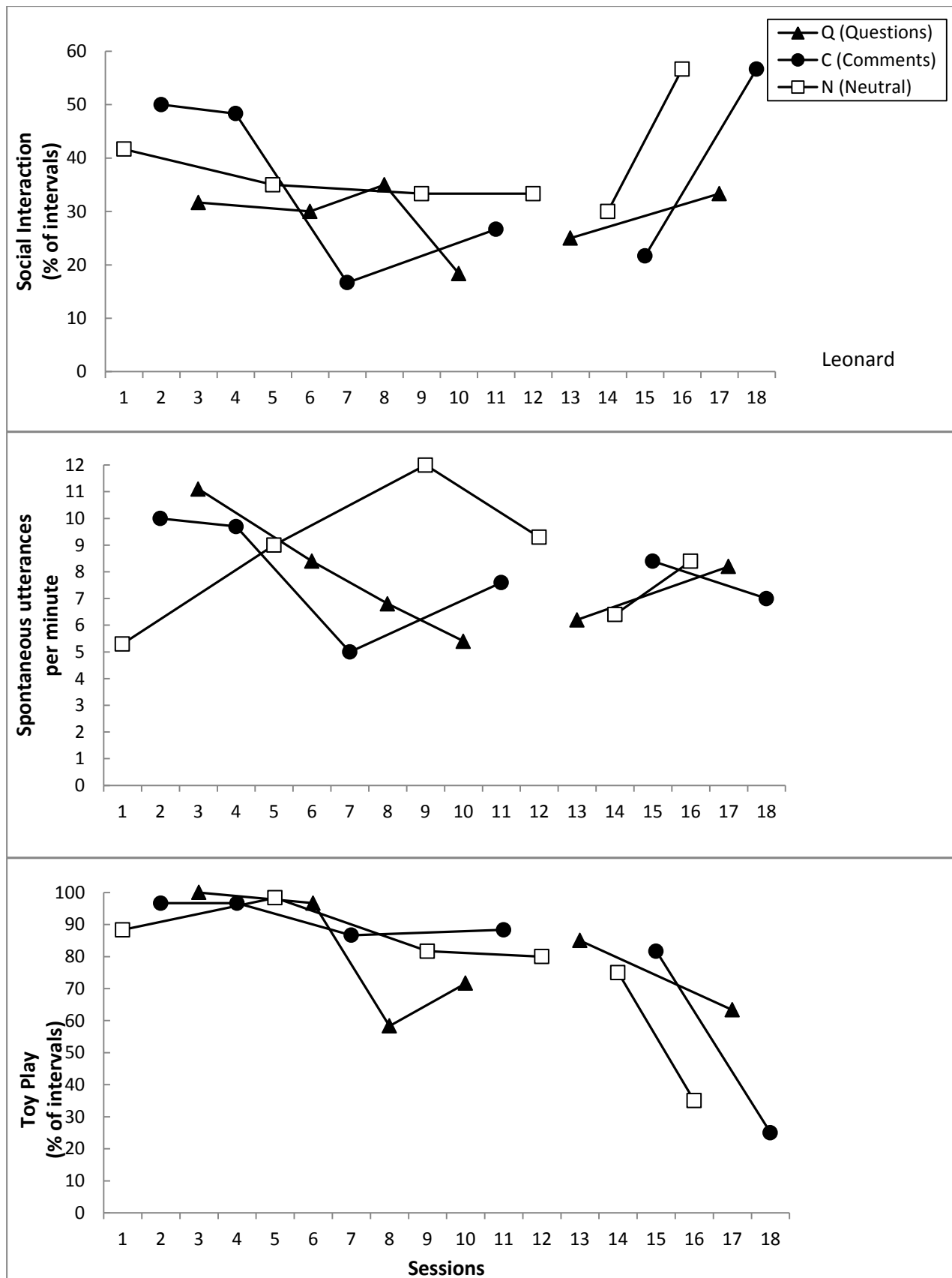


Figure 2. Percentages of social interaction, spontaneous utterances per minute and percentages of toy play for Leonard

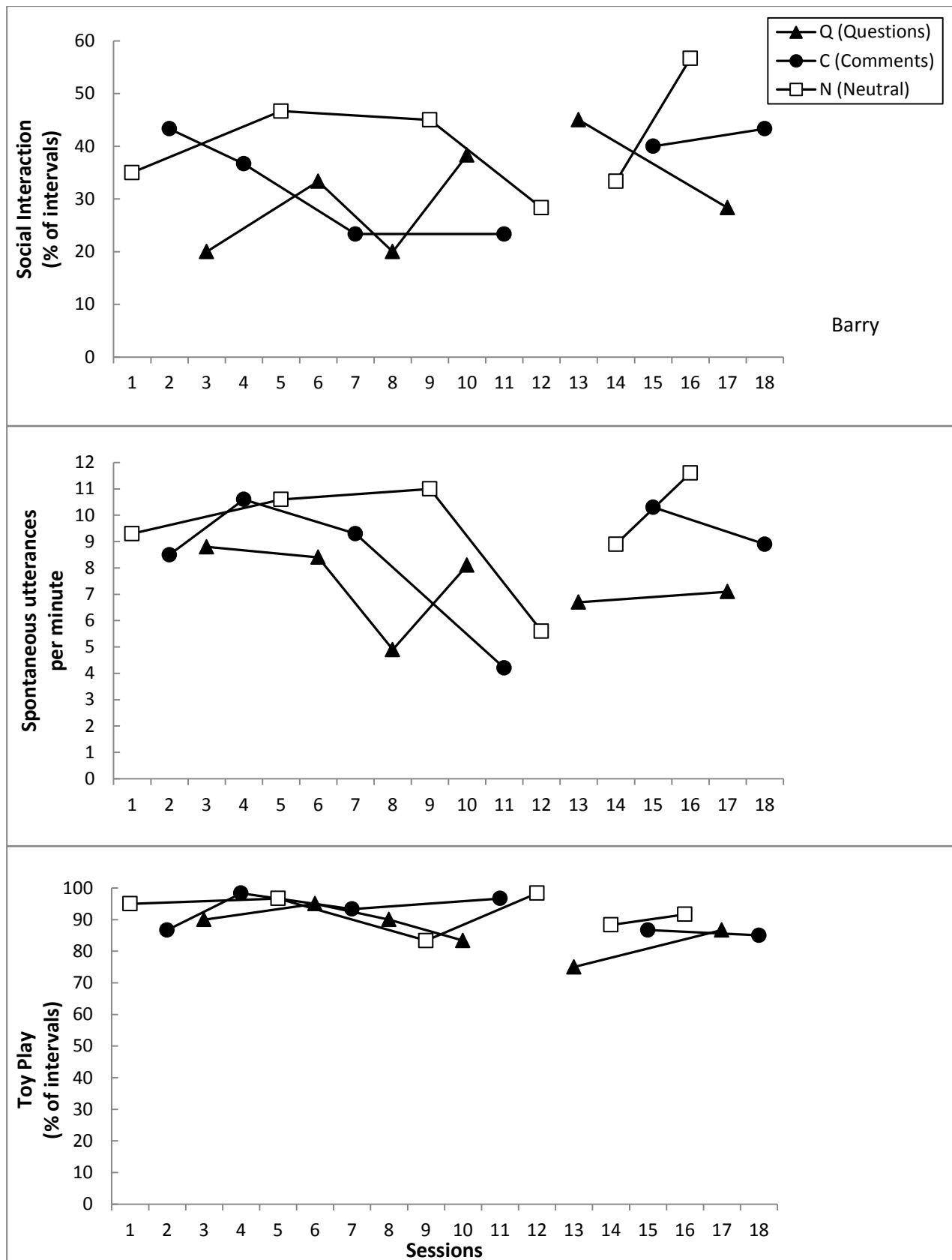


Figure 3. Percentages of social interaction, spontaneous utterances per minute and percentages of toy play for Barry

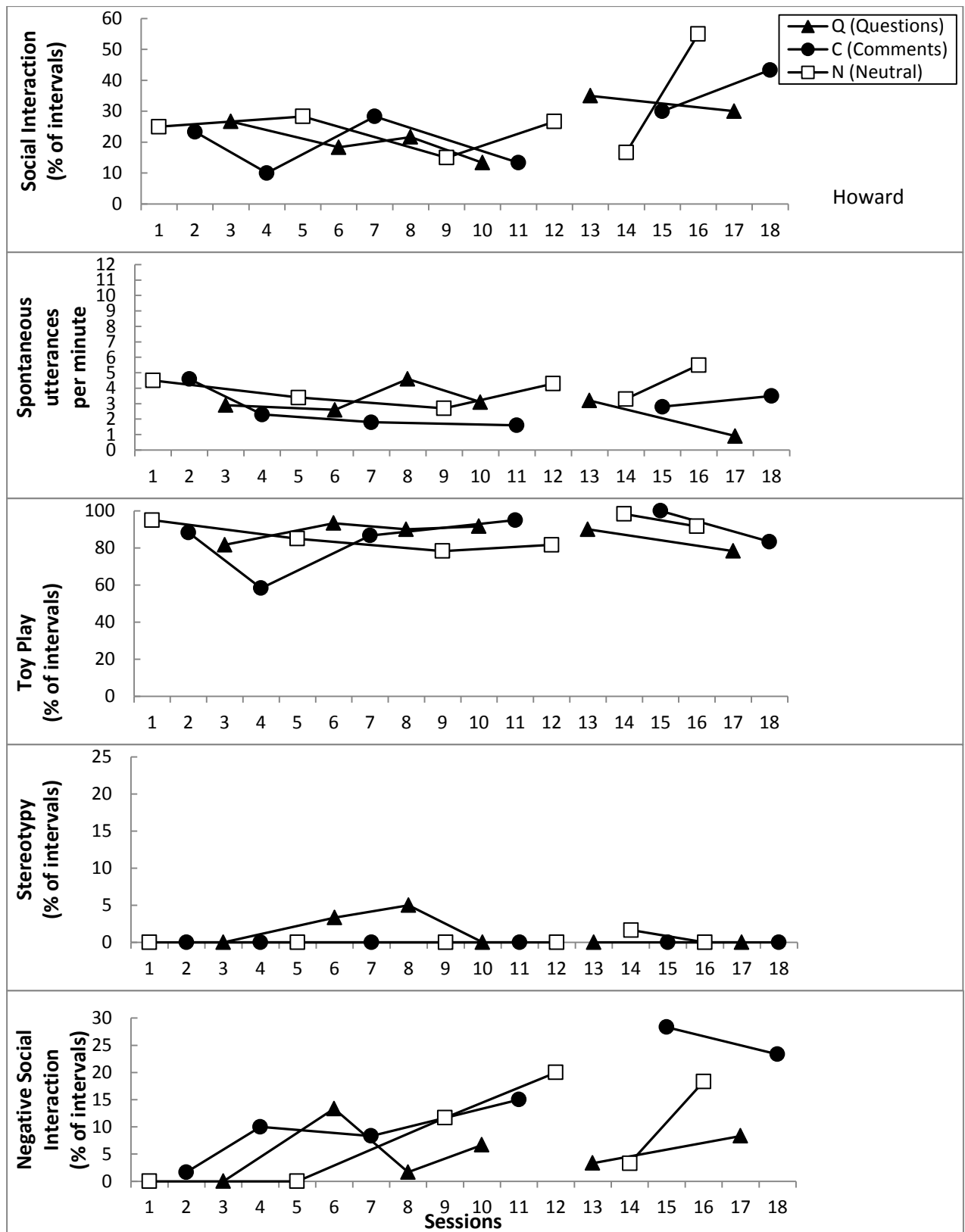


Figure 4. Percentage of social interaction, spontaneous utterances per minute, percentages of toy play, stereotypy and negative social interaction for Howard

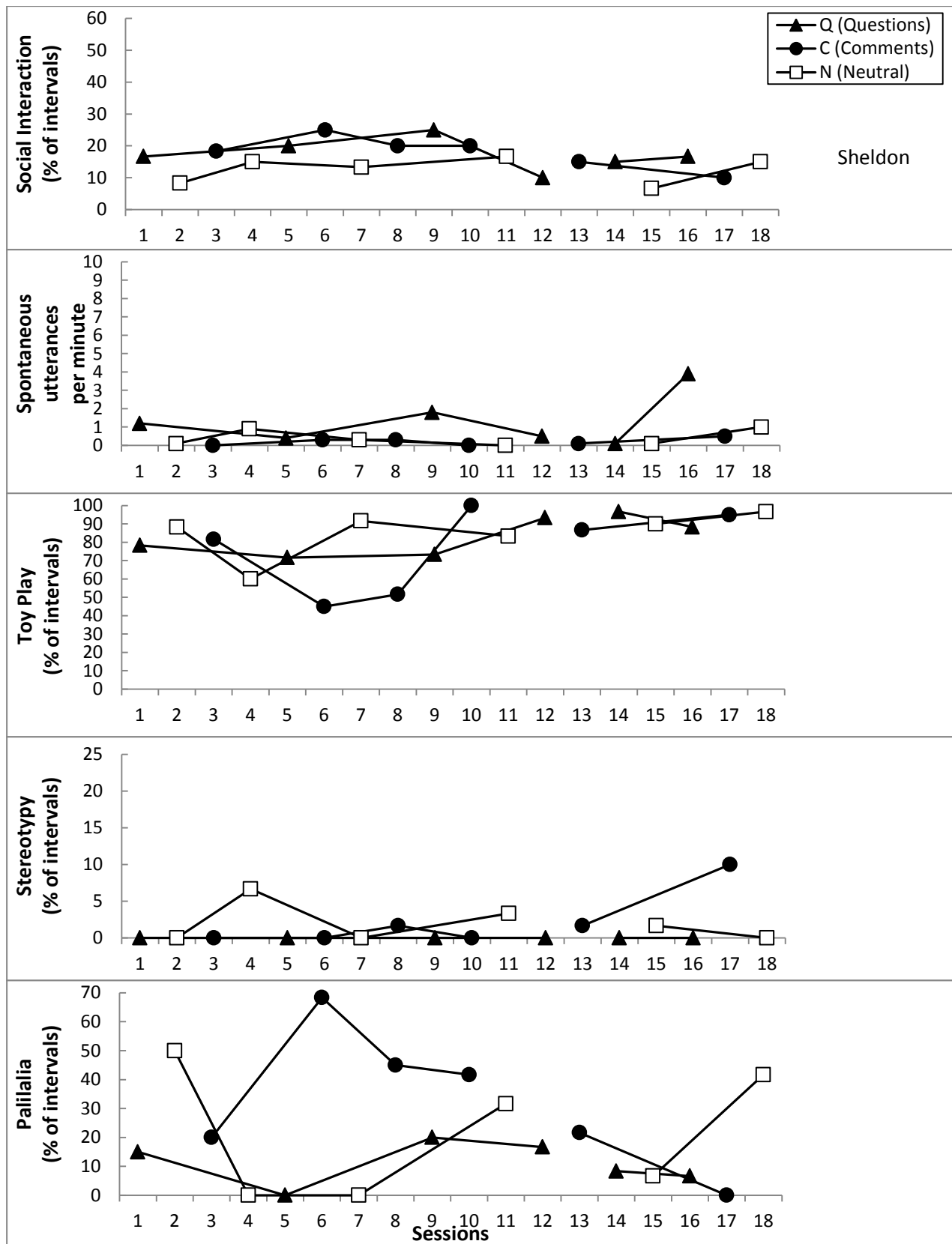


Figure 5. Percentage of intervals of social interaction, spontaneous utterances per minute, percentage of stereotypy and palilalia for Sheldon

One participant, Sheldon, responded very differently to the Questions condition than the other participants. As can be seen in Figure 5 he engaged most often in social interaction with the experimenter in the Questions and the Comments condition (respectively 17% and 18%) and least in the Neutral condition (12.5%). In addition, he emitted the most spontaneous utterances in the Questions condition (1.31 utterances per minute) compared to the Neutral condition (0.4 utterances per minute). Furthermore, Figure 5 shows he did not engage in stereotypy at all in the Questions condition (0%), whereas he engaged in stereotypy for around 2% of the time in the Comments and the Neutral condition.

His difference in responding in the Questions condition and the Comments condition is demonstrated in Figure 5. Sheldon spoke more, engaged in more toy play, and engaged the least in stereotypy in the Questions condition compared to the Comments condition. In addition, his level of palilalia was consistently higher in the Comments condition than in the Questions condition.

Although Sheldon had the fewest responses to the experimenter's comments, Table 2 demonstrates that all participants responded more frequently to questions than to comments. Out of 180 questions, their total responses (correct and incorrect) to questions varied between 124 and 155 responses, whereas their responses (correct and incorrect) to the same number of comments varied between 6 and 62 responses.

Table 2

Total responses to Questions and Comments and percentage correct responses for all participants.

	Questions		Comments	
	Total responses	% correct responses	Total responses	% correct responses
Will	124	62%	19	53%
Leonard	140	86%	52	94%
Barry	155	82%	60	85%
Howard	133	74%	62	50%
Sheldon	135	86%	6	83%

Discussion

We examined the effects of asking questions during play on the social interaction, spontaneous speech and toy play of children with autism. We hypothesized questions would be aversive for children with autism who, as a result, would interact less with the experimenter and play less with toys (Heal, 2009& 2011). Although we did not find a decrease in toy play as in the Heal studies, we found that in the Questions condition four out of five children (Howard, Will, Barry, and Leonard) interacted less with and spoke less to the experimenter than in the Neutral condition. Between these four, only two (Will and Howard) engaged in stereotypy, most frequently in the Questions condition. Several studies have shown that stereotypy may function as escape from demands (Mace, Browder & Lin, 1987; Mace & Belfiore, 1990). These findings are consistent with our hypothesis that asking questions during play may be aversive for children with autism, who may try to escape by engaging in stereotypy.

One participant's responses (Sheldon) differed strongly from the others. Contrary to the other participants, he interacted with and spoke most frequently to the experimenter in the Questions condition instead of the Neutral condition. He also had the lowest level of stereotypy in the Questions condition. For Sheldon, being asked questions seemed to improve his functioning; he engaged more with the experimenter when he was being asked questions compared to receiving mere comments. This is consistent with the literature on PRT (Koegel et al., 1996) where they use questions to promote social interaction. Contrary to the other participants with similar high scores on the VB MAPP, Sheldon did not initiate interactions with the experimenter spontaneously. Although he obtained high scores for manding in the VB MAPP, in a free-play situation he rarely asked the experimenter a question in order to obtain her attention or to get her corporation during play.

We did not find evidence that the participants touched toys less in the Questions condition. The participant with the highest score of stereotypy in the Questions condition (Will) turned away from the experimenter but continued to play with the toys. For him, we can conclude that questions were aversive based on the low percentage of intervals of social interaction and the high percentage of stereotypy in the Questions condition, not from a decrease in toy play. It is possible that the questions posed in this experiment were relatively easy to answer compared to the Heal studies (2009 & 2011). In their studies, the participants learned new responses, whereas in our study the children responded to questions they already mastered (see Table 2). Furthermore, the questions in our experiment were not linked to particular toys as in the Heal studies.

We conducted a condition with comments to investigate whether questions and not the experimenter's talking alone would affect the children's toy play, social interaction and speech. Based on Heal's study (2009 & 2011) and our past observations during clinical interventions, we expected comments would be less aversive for the participants than questions. We also expected no talking would lead to even more social interaction, spontaneous utterances and toy play. This hypothesis is confirmed by the results of Will and Barry. In the Comments condition Will engaged in more spontaneous social interaction, emitted more spontaneous utterances and played more with toys compared to the Questions condition. Barry clearly emitted more spontaneous utterances and played more with toys in the Comments condition compared to the Questions condition. For Leonard and Howard the results are too variable to compare the two conditions, although in Figure 4 (Howard), we can see an ascending trend and higher levels of negative social interaction in the Comments condition compared to the Questions condition. These findings suggest that, for some children, comments are less aversive than questions.

However, we expected to see a more convincing pattern of responding. We expected the participants would look at the experimenter or her toys after she made a comment about her toys. In addition, we expected our comments would prompt the participants to make comments as well. Most participants however, did not look at the experimenter or her toys after she made a comment about her own toys. Nor did they reciprocate comments from the experimenter. For instance, when the experimenter said: "I have a car!" the participants did not say, "I have an airplane!"

An unexpected finding was that for one participant, Sheldon, comments seemed to be more aversive than questions. He spoke least in the Comments condition. It is possible that the Comments condition was aversive to him because he did not know how to respond to the experimenter's comments, whereas he could answer many questions. However, Sheldon's high rate of spontaneous utterances in the Questions condition might also be due to the low level of palilalia (11% of intervals), compared to the Comments condition (37%) and the Neutral condition (25%). When engaging in palilalia, he had no opportunity to emit appropriate speech.

All participants responded very differently to the different conditions. These findings agree with Sherer and Schreibman (2005), who evaluated the differences between three children who responded well to PRT and three children who did not. They identified baseline behaviours that predicted better outcomes of PRT intervention. They found that children who greatly benefited from PRT initially played more with toys, approached the experimenter more often, had less avoidance behaviours, and engaged less in non-verbal stereotypy (but more in verbal stereotypy). This profile corresponds most with Will who, at the start of the experiment, had low levels of toy play, avoided the experimenter and had high levels of non verbal stereotypy. According to Sherer and Schreibman this participant would probably not benefit from PRT. Our research suggests a possible explanation why children with this profile

do not benefit from PRT. Because asking questions is an important part of PRT intervention, the outcome is influenced by the aversiveness of questions for a particular child. We hypothesize that adults around Will have approached him during play and asked him too many and too difficult questions in the past. By doing so, they may have created an aversive condition, motivating escape (Carbone, Morgenstern, Zecchin-Tirri & Kolberg, 2007). As a result, both the parent and the questions may have become aversive for him. Consequently, he may have learned that when he engaged in stereotypy, the adults stopped placing demands on him. When a child with such a history (of reinforcement and punishment) is approached by an adult, this resembles the aversive situation he knows and he tends to escape the situation. This child profile corresponds with the description of Sherer en Schreibman (2005).

The specific toys the participants played with had a big influence on their toy play, social interaction, and undesired behaviours. This is an important confound in this study. For example, Sheldon showed a high level of stereotypy when he played with the circus of Little People and when he played with cookie monster. However, when he read a book, he never showed any stereotypy. When Leonard asked the experimenter to draw animals, this greatly influenced his toy play and social interaction scores. Figure 2 shows that there is a decrease in toy play and an increase in social interaction in the last three sessions because during these sessions he asked the experimenter often to draw animals for him. We could have controlled this confound by carrying out a preference assessment before the study, so that we could have limited the different kind of toys the participants could play with. However, we fear that the participants would not have been motivated to play this long. In addition, this would have created a very unrealistic setting of "forced play".

It can be argued that participants spoke less in the Questions condition because they had less time to speak as the experimenter asked them three questions per minute. The participant's rate of responding to questions (correctly and incorrectly) varied between 2.07

responses per minute (Will) and 2.58 per minute (Barry). However, there was one participant, Sheldon, who clearly had the most spontaneous utterances in the Questions condition, in spite of the fact that his rate of answering questions was comparable to that of the other participants (2.25 answers (correct and incorrect) per minute). This participant may have had enough time to speak, despite his high number of responding to the experimenter's questions, because he had a very low percentage of spontaneous utterances. However, Leonard, with more than 10 spontaneous utterances per minute, also succeeded in emitting a very high percentage of spontaneous utterances in the Questions condition (see Figure 2). In fact, after this very high score in spontaneous speech in the Questions condition there is a descending trend for speech in this condition. This strengthens our hypothesis that asking questions may lead to a decrease in spontaneous utterances. However, it would have been best to control for this confound. For example, when the number of questions asked is noted per interval, it is possible to see whether there is more speech during intervals without questions than intervals with questions.

We noticed that especially Howard (see figure 4) but also Will wanted to escape from the experimental play situation. It is possible that they wanted to escape because of their previous experience with the experimenter during which she played with them in a different (and probably more natural) way. Nevertheless, the participants may also have come to dislike the entire situation. As there was no pause between conditions, they may have not been able to discriminate between the different conditions. We did not add a discriminative stimulus for every condition because we wanted to see whether the independent variables alone would influence the participant's behaviour.

The most important conclusions from this study can be drawn from the data on the social interaction of the participants with the experimenter. However, because many instances of social interactions lasted less than two seconds, it is possible that we missed instances of

social interaction. In future research, it might be better to use Partial Interval recording instead of Momentary Time Sampling to score social interaction.

This study was designed to evaluate the effect of asking questions on the social interaction, spontaneous utterances and toy play of children with autism because we often see parents asking their children too many and too difficult questions. We often see parents who try to follow their child's lead during play, but when they go and sit next to their child (to play with him), the child walks away. We hypothesized that these children avoid/escape their parent's presence during play because of the questions being asked. In this study, we found that four out of five participants interacted less and engaged less in spontaneous speech if the experimenter asked questions during play. However, most participants could answer a large percentage of the questions and this is not representative for the parents of young children with autism, who tend to ask their children many questions they cannot answer. It would be interesting to conduct a study in which too difficult questions are compared to questions the children can easily answer. It would be interesting to investigate the difference between questions. In this study, questions such as: "What is that?" were often correctly answered by the children. Questions such as: "What is he doing?" were rarely answered. These questions seemed to be too difficult for most children but were only asked by the experimenter sporadically. Questions such as: "what do you want to play with?", "shall we play with the X?" or "Shall we bounce the ball?" were mostly ignored.

We found that the participants rarely responded to the experimenter's comments. We suspect that teachers and parents of children with autism tend to focus more on teaching the children to answer questions than to teaching appropriate responding to comments. In PRT for example, peers are taught to ask the child with autism questions in order to encourage and extend conversation (Koegel et al., 1996). However, when the child with autism finds himself in a natural environment with untrained peers, these peers will probably make many

comments and expect the child with autism to respond to them. When the child with autism does not respond to the peer's comments, the peer may lose interest and stop playing with the child with autism. Therefore, parents and practitioners should not only teach children to respond to questions but also teach them to respond appropriately to comments.

Finally, more research would be useful to identify which types of questions may be aversive for children with autism and under which conditions. In addition, as a child's history of conditioning influences their responding to the intervention, practitioners could benefit greatly from research into which styles of intervention may correspond best with the profile of the child they are working with.

Appendix I, Table of sequence of conditions

Table 1

Sequence of conditions presented to each child. Each row represents one session of six 10-minute periods.

1	2	3	4	5	6
N	C	Q	C	N	Q
C	Q	N	Q	C	N
Q	N	C	N	Q	C

Table 2

Number of occurrence of sequence of conditions within each session.

Sequences of conditions (within sessions)	Number of occurrence
NQ	3
QN	2
CQ	2
QC	3
NC	2
CN	3

Appendix II, List of toysToys visible in large cupboard

Marble track, ball track and Fisher Price car track
Disney Pop-up and animal Pop-up
Picture books, educational books, story books
Wooden blocks
Jigsaw puzzle, wooden puzzles in a frame, floor puzzles
Fisher-Price stackers
Soft blocks
Play-Doh Mega sesame street and Play-Doh clown machine
Moon Dough with register and car
Playschool ball blowing machine
Bubbles
Three to put balls into

In drawers (but freely accessible)

Lego Duplo Lego Ville train set
Lego Duplo rails (approximately a hundred rails)
Lego Duplo large brick blocks (hundreds)
Lego Duplo farm animals, zoo animals and vehicles, little people.
Plastic animals and plastic insects
Jigsaw puzzle, wooden puzzles in a frame, floor puzzles
Colouring pens and Aquadoodle pens and colouring pens to write on windows

Displayed on child-sized tables

Fisher Price little people doll house
Fisher Price little people fire truck
Fisher Price little people Farm with animals
Fisher Price little people Pirate ship
Fisher Price little people bus and school

Wooden kitchen set

Sink and oven
Fruits and vegetables, meat and fish
Eggs, bread and cake
Saucepan and frying pan
Knives, forks and spoons

Appendix III, response definitions

Toy play included non-symbolic play as well as symbolic play.

Non-symbolic play was defined as manipulating or carrying or using a toy as the manufacturer intended. For instance, putting a ball in a ball blow machine, looking at pictures of a book, colouring, building a house with Lego, making a railroad, pressing buttons on a pop-up, or throwing a ball. Symbolic play was defined as holding a toy in his hands while making movements and/or talking about this toy and/or making the toy talk appropriately. For instance rolling a car on a floor or putting a doll in bed or saying "knock, knock" while making the puppet knock on the door or the dollhouse. Looking at experimenter's drawing was not scored as toy play, but as social interaction.

Social interaction with therapist was defined as looking at, smiling to, speaking to, or gently touching the therapist. Giving a therapist a toy, taking the therapists hand, voluntarily sitting on therapist lap, singing with therapist or walking towards the therapist with a friendly facial expression were also scored as social interaction with therapist. Looking at the therapists' toy or drawing was scored as social interaction as well. If a participant looked at or spoke to the experimenter because of the experimenter's question or comment, this was scored as prompted social interaction.

Stereotypy was defined as repetitive movements with body or with object with no apparent consequences for the individual who is emitting the response beyond the movement itself (Greer, Becker, Saxe & Mirabella, 1985). For instance, hand flapping, making a cord turn round and round, hand mouthing, object mouthing, hand-clapping, abnormal eye blinks, inappropriate laughing, rocking, spinning self, running around in small rounds, jumping up and down, nonsensical vocal utterances, looking at a book while moving quickly back and forth with upper-body. A non-functional, repetitive response had to occur for a duration of

more than 3 seconds to be scored as stereotypy. Will engaged most in stereotypy such as rubbing the lids of play doh containers, the surface of puzzles and other toys with his fingers.

Palilalia was defined by Greer & Ross (2008) as the repetition of previously heard speech.

The source is not immediate, as in the case of echolalia.

Negative social interaction was defined as behaviours that demonstrated the child wanted to get out of the room or make the therapist go away. Examples are: telling the therapist to go away, saying that they wanted to get out of the room, asking if the session can be stopped or how much longer he has to stay, telling the therapist to stop, lying on the ground without engaging in play, asking if he can go to his mother and trying to leave the room by opening the door.

Utterances were defined as functional words or sentences the participants emitted. Some children, like Will and Sheldon merely uttered one-word sentences, whereas the other participants emitted full sentences. A sentence (whether it consisted of one or four words and whether it was finished or not) was scored as one utterance. Prompted speech was scored when the participant responded to the experimenter's questions and comments.

Appendix IV, informed consent**Ysgol Seicoleg
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Factors that influence play behaviour in children with autism**Information about the study**

You are invited to take part in a research study examining the factors that influence play behaviours in children with autism.

Why have I been asked to take part?

You have been asked to take part because you are a parent of a child with autism between 3 and 10 years old. All parents who attended workshops or otherwise heard from this research and can take part. There are no criteria for exclusion. The child can be a male or a female.

What does the study involve?

The study will require you to come to the ABA-Instituut, Professor Zeemanweg 25, 5144 NN Waalwijk, for three one hour free play sessions. During this 1-h play session the therapist will play with your child for 60 minutes. These 60 minutes are divided into six 10-minute periods. In every 10-minute period the therapist will play differently with your child. These different ways of playing with your child will be alternated among these 6 periods. The difference between periods will be the language the therapist will be using. In one period the therapist will ask your child questions during play. In another she will comment on what she is doing and in another period she will not ask any questions or make any comments during play. Your child can play with any toys in the playroom, he will not receive instructions and the therapist will respond in a warm and nice way to any adaptive behaviours.

If you have any complaints about how this study is conducted please address these to: Mr Hefin Francis, School Manager, School of Psychology, Bangor University, Gwynedd, LL57 2DG

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In order to gather enough data, we will need to conduct three 1-hour sessions. These sessions can take place on one day (for instance, from 10-11, then lunch, then one session from 13-14 and a last session from 16-17 hours). In between sessions you can go to have lunch with your child or you can go to a playground with him. However, it is preferable to have only one session per day spread out over 1 or 2 weeks.

It is important that your child has not played with toys 1,5 hour before he enters the play room and that he does not take any toys with him when he enters the play room. During the car ride to the centre, it is important to not give him a portable computer like a Nintendo game. He also should not watch any videos 1,5 hour before the play session starts. It is also important that he has eaten, drank and gone to the toilet before the session starts. When the therapist is playing with your child, you have to be seated in another room. The entire session will be filmed with one camera held by an observer and one cameras standing on a tripod. This will enable us to score the behaviours of the therapist and your child after the sessions.

Are there any benefits or risks?

The risks are that your child might not like to play for 60 minutes with the therapist. In that case, the session will end earlier. The toys available in the room are for children between 3 and 10 years old. There may be play-doh available and liquid for bubbles as well as small parts (like caps from pens), which he can put in his mouth. If you think your child might put these things in his mouth, please mention this before the session and the therapist will remove toys that might be dangerous for your child. By participating in this study we will learn more about the factors that influence play behaviours of children with autism. It is often hard to play with children with autism and by participating in this study you will contribute to more knowledge on this topic. Also, after the three sessions, you will receive some advice with respect to your child's play skills. This debriefing will last approximately 30 minutes.

What will happen to my data?

All data collected will be confidential, and you will not be identifiable in any report, thesis or publication which arises from this study. The data from this study will be stored securely for 10 years. If you choose to withdraw from the study and your data is identifiable to the research team, then you have the right to request that your data is not used.

If you have any complaints about how this study is conducted please address these to: Mr Hefin Francis, School Manager, School of Psychology, Bangor University, Gwynedd, LL57 2DG

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What if I don't want to take part?

It is up to you to decide whether or not you would like to participate in this study.
Deciding not to take part will not impact any other aspect of your relation with the ABA-Instituut.

Who do I contact about the study?

Caroline Peters, BCaBA
Nijlring 83
5152 VJ DRUNEN
Tel: + 31 6-48970373
E-mail: caroline@aba-instituut.nl

Who do I contact with any concerns about this study?

If you have any concerns or complaints about this study, or the conduct of individuals conducting this study, then please contact If you have any complaints about how this study is conducted please address these to: Mr Hefin Francis, School Manager, School of Psychology, Bangor University, Gwynedd, LL57 2DG

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Research Consent Form for Parents

	Please Initial box
I confirm that I have read and understand the information sheet for the above study.	
I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
I understand that my child's participation is voluntary and that I am free to withdraw him / her any time without giving any reason, without my child's legal rights being affected.	
I give consent for videos of myself and my child which will be taken of the entire free-play session. These will be used to score the data afterwards.	

Please complete the following

Signature_____

Date_____

Your name _____

Your child's name _____

Address_____

_____Postcode_____

Please return this form, at your earliest convenience, to

Caroline Peters, Nijlring 83, 5152 VJ, Drunen.

If you have any complaints about how this study is conducted please address these to: Mr Hefin Francis,
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